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BERNAUX (P.). **Notes de pathologie végétale méditerranéenne.** [Notes on plant pathology in the Mediterranean.]—*Rev. Path. vég.*, 30, 1, pp. 16–24, 1 pl., 1951.

This annotated list of fungi polyphagous or ubiquitous in the Mediterranean region of France [*R.A.M.*, 29, p. 479; 30, p. 55] includes the following. *Septoria calendulae* n.sp. forms grey-brown, circular or elongated, amphigenous spots on the leaves of the weed *Calendula arvensis*. The pycnidia measure 60 to 75 by 60 μ and the triseptate conidia 30 to 40 by 1 μ. *S. lavandulae* [ibid., 30, p. 585] occurs on *Lavandula latifolia*. *S. cisti* n.sp. causes amphigenous, ochraceous, irregular, confluent spots on the leaves of *Cistus albidus*. The conidia are 22 to 33 by 2·5 μ, mostly triseptate and rounded at the apex. *Selenophoma brachypodii* n.sp. on *Brachypodium phoenicoides* has pycnidia measuring 45 to 75 by 28 to 45 μ, scattered between the veins, and fusoid, unicellular, apically acute, curved, hyaline conidia 14 to 20 by 1·5 to 2·5 (3) μ. *Hendersonia asteris* n.sp. on *Aster acer* is characterized by brown, globose pycnidia, 140 by 125 μ, and ellipsoid-cylindrical conidia, 8 to 12 by 4 to 6 μ, pale and unicellular at first, becoming uni-, bi-, or triseptate, brown to olivaceous, rounded at the apex, and slightly constricted at the septum. *Lophodermium pinastri* [ibid., 30, p. 439] on *Pinus halepensis* is believed to be a new host record.

VIENNOT-BOURGIN (G.). **Notes mycologiques. III.** [Mycological notes III.]—*Rev. Path. vég.*, 30, 1, pp. 35–53, 2 figs., 1951.

This list of the microfungi collected in the Gironde Valley, Pelvoux massif, France, during August, 1950, the last of this series [cf. *R.A.M.*, 30, p. 546], includes notes on the more interesting species, among them the conidial state of *Higginsia* [*Coccomyces*] *hiemalis* [ibid., 30, p. 55], which is widespread on both wild and cultivated cherry, *Leveillula taurica* [C.M.I. map No. 217] on *Teucrium chamaedrys*, *Puccinia graminis* on *Poa alpina*, and *Puccinia violae* on *Viola cenisia*. A severe progressive wilt of aspen (*Populus tremula*) in the Vallouise region associated with a wet rot beneath the bark of the trunk about 2 m. above the soil was largely due to *Rosellinia aquila* [*R.A.M.*, 20, p. 497], hitherto frequently considered a saprophyte. Further investigation is required as the condition is likely to be of economic importance. *Sclerospora graminicola* occurred on *Setaria viridis*, *Uromyces phleimichelii* on *Phleum pratense*, believed to be a new host record, and *Ustilago poae-nemoralis* n.sp. on *Poa glauca*, having deep olivaceous-brown, minutely verrucose spores measuring 8·4 to 12·6 by 8·4 to 10 (average 10·8 by 9·1) μ.

LING (L.). **Taxonomic notes on the Ustilaginales.**—*Lloydia*, 14, 2, pp. 101–110, 1 fig., 1951.

Notes are given on several more smuts in various herbaria [*R.A.M.*, 29, p. 124], including three new species and three new combinations.

Schweizer (J.) & Reitsma (J.). **Blisterblight situatie in de bevolkingstuinen in het Sukabumische.** [Blister blight situation in the gardens of the native population in the Sukabumi district.]—*Bergcultures*, 20, 13, pp. 231, 233, 235, 1951.

Reports concerning the rapid extension and virulent character of blister blight [*Exobasidium vexans*] in the tea gardens of the native population in the Sukabumi district of Java [*R.A.M.*, 30, p. 630 and next abstract] prompted an inquiry, which was started on 7th June, 1951. A large part of the area lying within the Residency of Bogor at an elevation of 400 to 500 m. was found to be entirely free from the disease. In the Sukabumi–Tjiandjur region, at altitudes of 600 m. and upwards, conditions are much more conducive to the spread of infection and a regular spraying schedule, using copper oxide or copper oxychloride, will have to be applied during the west monsoon.

Vollema (J. S.). **De landbouwkundige zijde der blister blight bestrijding.** [The agricultural aspect of blister blight control.]—*Bergcultures*, 20, 13, pp. 235–236, 1951.

Planters are warned against sudden and unduly drastic thinning of shade trees for the control of blister blight of tea [*Exobasidium vexans*] in Java [cf. *R.A.M.*, 30, p. 587 and preceding abstract]. Useful and often indispensable functions of shade trees include enrichment of the soil with humus; suppression of weeds which provide a favourable micro-climate for the pathogen; and protection of the frame branches from sun scorch. Pruning of the shade trees is helpful, while thinning and rejuvenation should be undertaken in plantations with luxuriant stands of Leguminosae. Large trees may be thinned advantageously by bark ringing, thereby obviating a sudden reduction of shade, which tends to promote a wide extension of the capsid *Helopeltis* [cf. ibid., 13, p. 327]. However, where urgent steps are indicated, e.g., in damp ravines which may otherwise become foci of infection, the trees may be killed by sodium arsenite solution introduced into a circular notch, about 5 cm. deep, in the wood ('frill girdling').

Walter (T. E.). **Summary of discussions on the proceedings of the first day.**—*Tea Quart.*, 22, 1, pp. 4–17, 1951.

This is a summary of the discussions which followed papers on tea blister blight [*Exobasidium vexans*] read on the first day of the Conference of the Tea Research Institute, Ceylon, held in December, 1950 [*R.A.M.*, 30, p. 586 and next abstract], with some miscellaneous papers and addresses, mostly on spraying and dusting.

Loos (C. A.). **Pathological problems.**—*Tea Quart.*, 22, 1, pp. 27–30, 1951.

In this paper, read at the ninth biennial conference of the Tea Research Institute of Ceylon held at Nuwara Eliya in December, 1950 [see preceding abstract], the author states that during the year *Calonectria theae* [*R.A.M.*, 29, p. 537] was particularly widespread, especially in areas where *Acacia decurrens* is grown as a shade tree or wind belt. The fungus may infect mature and young leaves through the stomata and cause severe defoliation of maintenance leaf when weather conditions favour spread over a fairly long period. The type of weather that favours blister blight [*Exobasidium vexans*: see preceding abstracts] also favours *C. theae*.

After a lapse of about 25 years, *Corticium invisum* [ibid., 30, p. 197] was found on three up-country estates.

Report of the acting Pathologist for the year 1949.—*Bull. Tea Res. Inst. Ceylon* 31, pp. 38–45, 1951.

In this report [cf. *R.A.M.*, 29, p. 250] C. A. Loos states that the failure of roots of tea bushes to make new growth after pruning in the Dimbula area was due to the

complete absence of starch reserves. Failure occurred in definite patches and brown lesions of irregular shape and size, ranging from minute spots to large patches several inches long, were observed on the roots. The discoloration of the bark or cortex extended only a few cells deep in the small lesions, but the whole depth of cortex was involved in the large patches. Isolations from the small spots and the advancing edges of the large lesions invariably gave rise to pure cultures of a *Cylindrocladium* [ibid., 30, p. 82], similar in morphological characters to one which causes a shoot wilt of plum varieties and cherry rootstocks in the United Kingdom [ibid., 23, p. 305].

The symptom of twisted leaves already observed on tea bushes affected by phloem necrosis virus disease [cf. ibid., 30, p. 82] has now been found on estates in the Nanu Oya and Kotmale districts, but the phloem was not necrotic.

G. D. Austin reports on p. 48 that *Leptothyrium theae* [ibid., 7, p. 745; 20, p. 7] was identified as the fungus responsible for the die-back of tea branches during the first year of pruning. This is the first report of the disease in Uva; it caused much concern in the Province in 1949, although it was probably present there much earlier.

Limasset (P.) & Cornuet (P.). **Étude de la corrélation entre l'âge des organes aériens et la quantité de virus contenue dans ces derniers chez le Tabac infecté par le virus de la mosaïque du Tabac (Marmor tabaci (Orton) Holmes).** [A study on the correlation between the age of the aerial organs and their virus content in Tobacco infected with Tobacco mosaic virus (*Marmor tabaci* (Orton) Holmes).]—*Ann. Inst. nat. Rech. agron.*, Sér. C (*Ann. Épiphyt.*), 1, 3, pp. 274–285, 5 graphs, 1950. [Received September, 1951.]

The results of these studies at the Central Station of Plant Pathology [Versailles] on tobacco mosaic virus [*R.A.M.*, 30, p. 198] from Samsun tobacco have been reported elsewhere [ibid., 28, p. 549].

Singer (S. J.), Bald (J. G.), Wildman (S. G.), & Owen (R. D.). **The detection and isolation of naturally occurring strains of Tobacco mosaic virus by electrophoresis.**—*Science*, 114, 2966, pp. 463–465, 2 diags., 1951.

A more extensive electrophoretic investigation [*R.A.M.*, 29, pp. 402, 494] at the California Institute of Technology and the University of California, Los Angeles, of tobacco mosaic virus from an infected tobacco plant revealed the presence of two virus components, which exhibit symptomatic behaviour very reminiscent of Johnson's mild and severe strains [ibid., 27, p. 200]. Electrophoresis was used to separate the components, which were further distinguished by serological methods. The virus, supplied in dry leaf by Johnson, was extracted from a mature leaf 16 days after inoculation. The main virus component constituted about 40 per cent. of the total protein, and the minor component, later proved to be virus protein also, represented only about 5 per cent. Another, still more slowly moving component of unknown nature, not present in the extract from healthy leaves, was also detected. About 2 gm. of virus mixture from a group of Turkish tobacco plants was used for the isolation of the minor component as follows. After the complete separation of the virus components by electrophoresis a capillary tube was lowered into the descending limb of the electrophoresis cell, and the tip positioned in such a way that the most slowly moving component (mild) could be withdrawn from the mixture. In sedimentation rate it was indistinguishable from the other virus components of the mixture, and electron micrographs showed it to consist of rod-like particles very similar to ordinary tobacco mosaic virus. The severe and mild components gave rise to different symptoms and were readily separated by isolation from single lesions produced on *Nicotiana glutinosa* by high dilutions of the components. There was little difference between the two preparations in terms of

their qualitative reaction to rabbit antisera, but quantitative analysis of the precipitate showed that only part of the antibody to mild type virus was precipitated by the severe.

A recently examined local strain of tobacco mosaic virus produced mosaic symptoms on tobacco differing somewhat from those of common mosaic. The major component of this virus, constituting about 95 per cent. of the centrifugally isolated virus protein, had a mobility markedly different from that of the severe strain. Of the few strains of tobacco mosaic virus possessing electrophoretic properties differing significantly from those of the common variety, all had more alkaline isoelectric points [ibid., 31, p. 150] or smaller anionic mobilities than the common strain.

WILLIAMS (R. C.) & STEERE (R. L.). **Electron microscopic observations on the unit of length of the particles of Tobacco mosaic virus.**—*J. Amer. chem. Soc.*, 73, 5, pp. 2057–2061, 2 graphs, 1951.

At the Department of Physics, University of Michigan, small droplet patterns, obtained by spraying tobacco mosaic virus [*R.A.M.*, 30, p. 39; 31, p. 89 and next abstract] on specimen screens, are photographed with the electron microscope. It is found that in the semi-purified suspensions examined over 96 per cent. of the virus particles exist either as monomers of very uniform length or as dimers. The length of the monomer of the tobacco mosaic virus was found to be 298 ± 1 mμ.

WILLIAMS (R. C.), BACKUS (R. C.), STEERE (R. L.). **Macromolecular weights determined by direct particle counting. II. The weights of the Tobacco mosaic virus particle.**—*J. Amer. chem. Soc.*, 73, 5, pp. 2062–2066, 1951.

A method is described for the determination of the particle weight of tobacco mosaic virus in which the number of particles in a known dry weight of virus material is computed by counting particles in a known volume with the aid of the electron microscope [see preceding abstract]. The monomeric unit of length of the tobacco mosaic virus particle is taken as the elementary particle of which the weight is determined. The dry weight of the monomer of centrifugally purified tobacco mosaic virus was found to be 49×10^{-6} gm./mol.

CLAYTON (E. E.) & MCMURTREY (J. E.). **Tobacco diseases and their control.**—*Fmrs' Bull. U.S. Dep. Agric.* 2023, 70 pp., 49 figs., 1950.

This bulletin, an extensively amplified version of *Bull.* 1256 [*R.A.M.*, 4, p. 317], presents much valuable information on the symptomatology, etiology, and control of the bacterial, fungal, and virus diseases and physiogenic disturbances of tobacco in the United States. A list is given of resistant varieties of recent development and keys are supplied to the identification of the major diseases and malnutritional disorders.

VALLEAU (W. D.). **Longevity of the Tobacco black shank fungus in the soil in the absence of Tobacco.**—*Plant Dis. Reptr*, 35, 10, pp. 453–454, 1951. [Multilithed.]

As a result of a total loss due to black shank (*Phytophthora parasitica* var. *nicotianae*) [*R.A.M.*, 31, p. 33] in two Millersburg fields in 1947, the farmer stopped growing tobacco until 1951 when the variety Ky 16 was planted. By September there was no sign of black shank in one field and only one affected plant in the other. Similarly, in Franklin County, susceptible Ky 57 showed no loss from the disease, though planted in a field where infection had been severe four years previously. Complete loss of a tobacco crop in 1947 also occurred in Owsley County. The field was sown with grass, and in 1951 one of Dr. Jenkins's resistant strains of

Burley was planted. Under severe infestation conditions losses among these varieties are often over 50 and sometimes up to 100 per cent. Here, however, there was no sign of the disease by the middle of August, though it was severe in fields near by. In Bath County, where the disease has been present since 1942, a grower, using a rotation of grass for about three years between tobacco crops, has encountered only an occasional death from black shank, and this probably due to recontamination by workers.

These observations indicate a possibility of eradicating the fungus from the soil and of growing a clean crop provided the field has been under grass for at least three years, is not irrigated from a black shank field, and does not become recontaminated from infested soil on shoes, tools, animals' feet, or similar sources.

Foot rot and similar diseases of Tomato and other plants.—*Adv. Leafl. Dep. Agric. Scotl.* 16 (N.S.), 8 pp., 6 figs., 1950. [Received November, 1951.]

Descriptions are given of the symptoms, causes, prevention, and control of damping-off and root and foot rots caused chiefly by *Phytophthora cryptogea* and *P. parasitica* [*R.A.M.*, 29, pp. 200, 540], and toe rot caused by *P. verrucosa* [ibid., 20, p. 91, and below, p. 256] all affecting tomato plants in Scotland.

Gorlenko (M. V.) & Voronkevich (I. V.). Черная бактериальная пятнистость Томатов. [Bacterial black spot of Tomato.]—Докл. Акад. сельскохоз. Наук. Ленина [*Rep. Lenin Acad. agric. Sci.*], *1950*, 3, pp. 24–29, 1950.

In 1949 *Bacterium vesicatorium* [*Xanthomonas vesicatoria*: *R.A.M.*, 29, p. 62] was isolated from diseased tomatoes at the Pan-Slav Institute for Plant Protection, Moscow, and was found to be the cause of the bacterial black spot of tomatoes which has been present in several regions of the U.S.S.R. since 1936 [ibid., 18, p. 379]. Studies on five strains of the bacterium showed that the best growth on potato agar occurred between 25° and 30° C. Under both experimental and field conditions fairly high temperature combined with high humidity appeared to be most conducive to the development of the disease, the time just before and up to the beginning of fruit maturity (June and July) being the most favourable in the field.

Control measures [ibid., 28, p. 199] include changing the soil and disinfecting the woodwork of frames in which the disease has been observed, disinfection of seed obtained from infected areas, and deep ploughing of all plant debris in the autumn.

Alexander (L. J.). **Ohio W-R Globe, a new wilt-resistant glasshouse Tomato variety.**—*Res. Bull. Ohio agric. Exp. Sta.* 689, 19 pp., 6 figs., 3 graphs, 1949. [Received January, 1951.]

A description is given of the new Ohio W-R Globe tomato, resistant to the common form of *Fusarium oxysporum* f. *lycopersici* [*F. bulbigenum* var. *lycopersici*: *R.A.M.*, 30, pp. 453, 549] but highly susceptible to race 2 [ibid., 31, p. 35]. It is not resistant to any of the other diseases of glasshouse tomatoes. It was bred at the Ohio Agricultural Experiment Station, Wooster, the resistant parent being the Missouri Accession 160 of *Lycopersicon pimpinellifolium* [ibid., 24, p. 434], the only introduction of the species possessing a dominant gene which conferred an immunity type of resistance in a simple Mendelian ratio. This was crossed with several varieties of domestic tomato in succession. The yield of Ohio W-R Globe usually equals that of Globe where wilt is not a problem.

Spencer (E. L.) & Beckenbach (J. R.). **Blossom-end rot of Tomatoes.**—*Circ. Fla agric. Exp. Stas* S-6, 7 pp., 1 fig., 1949. [Received November, 1951.]

Blossom-end rot of tomatoes [*R.A.M.*, 29, p. 88] is caused by a temporary but severe water deficit in the whole plant, resulting in a rapid withdrawal of water

from the fruit. In nutrient sand cultures nitrate nitrogen produced fruit much less susceptible to the disorder than did ammonium nitrogen or a mixture of both. High pH (7 to 7·5) also reduced the likelihood of blossom-end rot, but only with a nitrate nitrogen solution. In variety tests [ibid., 29, p. 291] Rutgers and Manahill were more resistant than Grothen's Globe. Certain cultural practices help to minimize losses from the disease [ibid., 24, p. 252], viz., maintaining the water table as constant as possible, and the soil at a minimum pH of 5·5 by the use of basic slag and dolomitic limestone, side-dressing with nitrate when the plants reach blossoming, encouraging soil ventilation, and using resistant varieties.

LENTZ (P. L.). **Labrella coryli (Desm. & Rab.) Sacc. on Filberts in North America.**—*Plant Dis. Reptr*, 35, 10, pp. 437–438, 1 fig., 1951. [Multilithed.]

Labrella coryli [*R.A.M.*, 14, p. 680; 23, p. 4] was identified at the Division of Mycology and Disease Survey, United States Department of Agriculture, as the apparent cause of severe defoliation of F_1 hybrids of *Corylus americana* with *C. avellana*, which occurred as the nuts were filling. Disease symptoms on the leaves appeared first as a marginal browning near the tip, gradually spreading all round and inward toward the midrib. The lesions, irregular in shape, lacked conspicuous margins, but transitions from dead brown to living green areas were abrupt. The dead margin tended to roll inward over the upper surface.

BRODIE (H. J.). **The function of the cups of Polyporus conchifer.**—*Science*, 114, 2972, p. 636, 1951.

Observations in the Botany Department, Indiana University, Bloomington, showed that the cup-shaped structures at the base of the sporophores of *Polyporus conchifer* (on elm) are special organs for the dissemination by a splash-cup mechanism [*R.A.M.*, 31, p. 197] of special rod-shaped spores or oidia, 3 to 8 by 3 μ. They develop in late summer, mostly before the shelf portion of the fruit body has formed and before basidiospore discharge has started. The reproductive period of the fungus is thus greatly prolonged. The oidia germinated in 24 to 36 hours in the laboratory.

KHAN (A. H.). **Some diseases observed in the Teak plantations of East Bengal.**—*Pakistan J. For.*, 1, 3, pp. 209–212, 2 figs., 1951.

The two diseases of teak herein reported from the Hazarikhel and Kaptai areas of East Bengal are leaf rust (*Olivea* [*or Chaconia*] *tectonae*) [*R.A.M.*, 29, p. 545] and a root rot of undetermined fungal origin. The former disease is readily controllable by opening up the canopy during thinning operations. The spread of the latter disease is facilitated by the cultivation of teak in pure stands, which should be replaced by mixtures. The dead trees should be cut and used or burnt *in situ* instead of being left to rot. Shrubs near the trees should also be cut in the course of thinning and burnt. Encircling the trees with trenches 3 by 4 ft. is useful in restricting the rot to a limited area. The trenches must be kept free of debris.

WOLF (F. A.). **A new needle-cast fungus on Chihuahua Pine.**—*Lloydia*, 14, 2, pp. 111–114, 7 figs., 1951.

During 1949 the author observed a needle disease of Chihuahua pine (*Pinus leiophylla*) in Mexico State, Mexico. Affected needles collected during October and November bore fully matured hysterothecia with well-developed ascospores. The former occurred singly or in groups of two or three on isolated, small, greenish-yellow lesions on either leaf surface. The asci are broadly saccate, rounded above and measure 130 to 175 by 35 to 40 μ. The hyaline, cylindrical ascopores, tapering at the lower end and blunt at the upper, are surrounded with a gelatinous layer about 5 μ thick and measure 35 to 45 by 6 to 7 μ. The paraphyses are filiform and

inflated at the apex, with a gelatinous sheath. The bacillar, sheathed spermatia measure 4 to 5 by 0·8 to 1·0 μ. The spermogonia have the same gross appearance as the hysterothecia but are rather smaller. The fungus differs from *Hypoderma saccatum* [*R.A.M.*, 12, p. 254] in that the latter occurs only on *P. edulis* and its fruiting bodies are about two-thirds the size of those on Chihuahua pine. It is named *H. mexicanum* n.sp.

Baxter (D. V.). **Some resupinate Polypores from the region of the Great Lakes. XXI.**—*Pap. Mich. Acad. Sci.*, 35, (*1949*), Part I, pp. 43–59, 6 pl., 1951.

In this further contribution to the study of North American polypores [cf. *R.A.M.*, 29, p. 485] full descriptions are given of *Polyporus distortus*, *Trametes mollis*, and *Poria subserpens*, all on a number of broad-leaved trees in North America, and *Fomes subroseus* [ibid., 30, p. 18]. The last-named differs from *F. roseus*, to which it is closely allied, in rate of development and optimum growth temperature [ibid., 8, p. 147]. The rots these two species produce in conifers are identical. At first the wood is somewhat darker than normal, becoming considerably darker as decay progresses. Pink to red-brown patches appear in elongated areas and coalesce. On drying the wood shrinks and breaks up into cubes. In general, heart rot caused by *F. subroseus* in *Prunus* orchards may be prevented by not pruning the main leader branches. Wounds should be treated with an antiseptic dressing such as Bordeaux paint. Forest trees should be cut in relatively short rotations and coniferous pulpwood peeled before storage. Ricking pulpwood in raised piles on concrete or treated skids or piers is preferable to conical piling for preventing rot.

Foster (R. E.) & Foster (A. T.). **Studies in forest pathology. VIII. Decay of Western Hemlock on the Queen Charlotte Islands, British Columbia.**—*Canad. J. Bot.*, 29, 5, pp. 479–521, 6 pl., 6 graphs, 1 map, 1951.

An investigation of decay of western hemlock (*Tsuga heterophylla*) in ten selected areas on the Queen Charlotte Islands, British Columbia, conducted by the Dominion Laboratory of Forest Pathology, Victoria, from 1945 to 1947 [cf. *R.A.M.*, 29, p. 392] indicated that losses in old-growth stands amount to 13·9, 8, and 10·7 per cent. of the gross volume for log grades 1, 2, and 3, respectively. Total losses, including dead trees, were 25·5 per cent. of the gross volume. The most important of the 27 decay-producing fungi isolated were *Fomes pinicola* (12·1 per cent. of total infections), *F. pini* (6·3), *F. annosus* (10·3), and *Polyporus sulphureus* (5·7) [loc. cit.], other fungi occurring frequently being *Sterum abietinum*, *Poria subacida*, *Armillaria mellea*, and *P. tsugina*. Scars provided the most frequent and roots the most important avenues for decay. A detailed analysis of the logs of 2,318 trees showed that decay increased progressively with diameter, age, and decreasing site quality. Understory trees gave a substantial yield of sound wood.

Finholt (R. W.). **Improved toximetric agar-dish test for evaluation of wood preservatives.**—*Analyt. Chem.*, 23, 7, pp. 1038–1039, 1951.

At the Union College, Schenectady, New York, various improvements and simplifications have been introduced into the agar dish test for the evaluation of wood preservatives [*R.A.M.*, 31, p. 154]. The toxic substance is mixed with a malt extract agar solution, using a Waring Blendor, and the efficiency of the preservatives judged by ascertaining the minimum concentration necessary to prevent growth of standard wood-destroying fungi, Madison 517 [*Polyporus tulipiferus*: ibid., 16, p. 290; 29, p. 592] and *Lentinus lepideus* in these experiments. This method is effective with oil-soluble substances which are usually difficult to test in agar solutions, and check results can generally be obtained to within ± 5 per cent.

BARMACK (B. J.). **'Dentistry' saves wood poles, stops pole-top heart rot.**—*Elect. World*, 136, 3, pp. 112–113, 5 figs., 1951.

Investigations begun in 1942 by the Engineering Department, Commonwealth Edison Co., Chicago, revealed the occurrence of [unspecified] heart rot in the tops of hundreds of standing western red cedar [*Thuja plicata*] poles on the company's system, mostly between 11 and 18 years old. The method devised by the author for their treatment consists in cutting off the top about 1 in. below the 90° roof and removing the decayed material from the hole to expose the sound wood. The next step is to pour into the exposed cavity as much as may be necessary of a 5 per cent. pentachlorophenol-petroleum oil solution, followed by a paste prepared of 'fly ash' and pentachlorophenol solution. Finally, the 'filling' is protected from the weather by tacking a piece of slate-surfaced roofing paper to the top of the pole. To date about 2,000 poles have been treated by this very economical method with highly satisfactory results.

In an appendix directions are given for the determination of pentachlorophenol in treated wood by the sodium peroxide fusion method.

VASILJEVIĆ (Lj. A.). **Rhizoctonia solani Kühn** као проузроковач полегања расада. [*Rhizoctonia solani* Kühn as the causal agent of seedling damping-off.]—Год. пољоп. Фак., Београд [*Yearb. Fac. Agric., Beograd*], *1950–1951*, 3, pp. 263–270, 1 pl., [? 1951. French summary.]

Rhizoctonia [*Corticium*] *solani* was responsible for serious seedling damping-off of cabbage [*R.A.M.*, 22, p. 234; 30, p. 256], cauliflower [ibid., 7, p. 385], and [chilli] pepper [ibid., 22, p. 234; 30, pp. 89, 381] in Yugoslavia in 1951, damage in some places amounting to as much as 100 per cent. In a preliminary test at Crvenka University Farm, Beograd, after soil disinfection with 140 gm. copper sulphate per sq. m. cabbage seedlings suffered only occasional damping-off, which was of no consequence. In untreated beds 68 per cent. of the plants were destroyed and instead of an average of 20,000 cabbage heads per bed only 6,500 were obtained. To control the disease soil from infected beds should not be used for making hot-beds and all weeds, possible hosts of the fungus, should be destroyed. Chemical treatments (62 gm. formalin per sq. m. as a preliminary soil disinfectant or 300 gm. carbon disulphide per sq. m., injected into the soil) are suitable only for small areas of beds where infection is localized.

COLHOUN (J.). **Factors affecting the incidence of club root disease of Brassicae.**—*Nature, Lond.*, 169, 4288, pp. 21–22, 1952.

The author reviews the factors governing the incidence and severity of *Brassica* club root (*Plasmodiophora brassicae*) [*R.A.M.*, 31, p. 195; C.M.I. map No. 101] and describes experimental work carried out at the Plant Pathology Division, Queen's University, Belfast, before 1939. Water-tight containers with naturally contaminated garden soil, which had been treated with lime for several years, were used. Susceptible cruciferous crops grown in the garden had been severely attacked for many years even when the soil was alkaline. Within four weeks of being transplanted into soil of pH 6·3 in pots, all the Enfield Market cabbages developed large clubs under conditions favourable for infection in acid soils. Severe attacks also occurred when seedlings were potted in soil of pH 7·8 at different temperature levels. In both soils severe infection occurred at 70 per cent. of the maximum water-holding capacity. At pH 7·8 incidence was high only when the mean air temperature was 25° C. or more. At pH 6·3 numerous plants were infected at about 20°. The optimum temperature for infection in alkaline soils is therefore higher than 23°, but if it reaches a high enough level for a short time this may be sufficient

for infection to occur. When the soil moisture fluctuated higher degrees of infection were associated with the high moisture contents.

In 1949, when soil from the same garden, where crops susceptible to club root had not been grown for some years, was again used in greenhouse experiments, severe infection no longer occurred consistently. Accordingly spore suspensions of *P. brassicae* were added and the pH was adjusted to from 5 to approximately 7·5. The highest numbers of infected plants in alkaline soil were associated with the highest spore concentration. The experiments clearly demonstrated also that the conditions provided by relatively high temperatures and high constant or fluctuating soil moisture are most satisfactory for infection and disease development.

The results of greenhouse experiments in which the initial pH value was 7·8 in a sandy loam and 7·9 in a clay soil, falling to 7·1 and 7·2, respectively, five weeks after transplanting, indicated that the efficacy of lime for controlling *P. brassicae* is determined by the interaction of such soil factors as temperature, moisture, and spore load.

BLENCOWE (J. W.) & TINSLEY (T. W.). **The influence of density of plant population on the incidence of yellows in Sugar-Beet crops.**—*Ann. appl. Biol.*, 38, 2, pp. 395–401, 1951.

In experiments carried out in 1946 and 1947 at the Norfolk Agricultural Station, Sprowston, a study was made of the amount and distribution of beet yellows and beet mosaic viruses in sugar beet crops [cf. *R.A.M.*, 15, p. 277; 21, p. 103; 22, p. 393; 27, p. 218, and next abstract] under different conditions. In 1946 yellows spread slowly and averaged 16 per cent. at harvest. In 1947 infection was 60 per cent. by the end of July and averaged 80 per cent. at harvest. In 1946 wide rows (30 in., as opposed to narrow, 15 in.) increased the percentage of plants infected with yellows, especially when the plots were wide-singled (15 in.) rather than narrow (10 in.). The percentage of yellowed plants was also increased by a positive interaction between wide rows and a large-topped beet variety (Cannell's 937) compared with a small-topped (Marsters). In 1946 more of the former became infected than of the latter, whereas in 1947 fewer of the large-topped Cannell's 22 were infected than of the small-topped Kuhn P. In both years late sowing increased the percentage of yellowed plants. In 1946 nitrogen increased yellows, though in 1947 it had no effect. Rogueing reduced infection in 1946 but not in 1947. In 1946 there was too little mosaic for comparative counts to be made, but in 1947, though infection was slight, distribution on plots of varied plant population was similar to that of yellows.

In conclusion it is suggested that close planting would increase sugar beet yields and reduce losses from yellows.

WATSON (M[ARION] A.) & WATSON (D. J.). **The effect of infection with Beet yellows and Beet mosaic viruses on the carbohydrate content of Sugar-Beet leaves, and on translocation.**—*Ann. appl. Biol.*, 38, 1, pp. 276–288, 1 pl., 1951.

In studies at Rothamsted Experimental Station, Harpenden, the loss of total carbohydrate during a period of darkness from leaves of sugar beet infected with yellows virus [see preceding abstract and above, p. 169] was as great as that from the leaves of healthy plants. The theory of starch accumulation in infected leaves because of sieve-tube blockage is, therefore, incorrect. Older leaves of infected plants had a higher content of reducing sugars and sucrose, and usually of starch, at both the beginning and end of the dark period, than comparable leaves of healthy plants. This carbohydrate accumulation is due probably to changes in the physiology of the leaf cells. It caused a lowering of water content per cent. of fresh weight compared with healthy leaves.

The carbohydrate content of sugar beet leaves was little affected by infection with beet mosaic virus [*R.A.M.*, 30, p. 306].

Hingorani (M. K.). **Bacterial soft-rot of Peas.**—*Curr. Sci.*, 20, 7, p. 191, 1951.

Green peas in the markets of Delhi, India, in 1949 showed a yellow discoloration of the pods, while the seeds within were transformed into a mushy, malodorous bacterial mass. The causal organism was a species of *Erwinia* apparently belonging to the group described by Stanley (*Bull. W. Va agric. Exp. Sta.*, p. 287, 1938) as intermediate between *E. carotovora* and *E. aroideae*. It resembled the two species in its morphological and cultural characters and in most of its physiological features but differed from both in its slow liquefaction of gelatin (13 to 22 days) [*R.A.M.*, 31, pp. 9, 174] and slightly higher thermal death point (55° C.). It was pathogenic in inoculation experiments to potato, carrot, cucumber, tomato, chilli, radish, beet, eggplant, cauliflower, and other vegetables.

Campbell (J. A.) & Hoffman (J. C.). **The Regional Vegetable Breeding Laboratory introduces Contender, a new fresh-market Snap Bean.**—*Seed World*, 66, 2, pp. 14, 16, 46, 1 fig., 1950. [Received March, 1952.]

Contender, a new fresh-market snap bean [*Phaseolus vulgaris*] developed by the Mississippi, Florida, and Alabama Experiment Stations in co-operation with the U.S. Regional Vegetable Breeding Laboratory, is resistant to common bean mosaic [virus: cf. *R.A.M.*, 29, pp. 487, 549, 600] and has considerable resistance to powdery mildew [*Erysiphe polygoni*: ibid., 29, pp. 131, 191, 419].

Zaumeyer (W. J.). **Top Cropper in Snap Beans.**—*Seed World*, 66, 3, pp. 8, 62–63, 1 fig., 1950. [Received March, 1952.]

The information in this paper on the resistance of the new snap bean [*Phaseolus vulgaris*] variety Top Crop to bean mosaic, New York 15 mosaic, and pod mottle viruses has already been noticed from another source [*R.A.M.*, 29, p. 549].

Leonard (B. R.), Anderegg (J. W.), Karsberg (P.), Shulman (S.), & Beeman (W. W.). **On the size, shape, and hydration of southern Bean mosaic virus and Tobacco necrosis virus in solution.**—*J. chem. Phys.*, 19, 6, pp. 793–794, 1951.

Evidence is presented from comparative small-angle, X-ray scattering measurements, sedimentation, diffusion, viscosity, and partial specific volume determinations, electron micrographs, and sedimentation constants, pointing to a close resemblance in respect of size, shape, and hydration between the viruses of southern bean mosaic [*R.A.M.*, 30, p. 443] and tobacco necrosis [ibid., 31, p. 169].

Beemster (A. B. R.) & Van der Want (J. P. H.). **Serological investigations on the Phaseolus viruses 1 and 2.**—*Antonie van Leeuwenhoek J. Microbiol. Serol.*, 17, 5, pp. 285–296, 2 figs., 1951.

In studies in the Department of Virology, Wageningen, Holland, rabbit antisera against bean mosaic [*R.A.M.*, 28, p. 105] and bean yellow mosaic viruses [ibid., 30, p. 507] were obtained with sap from French bean (*Phaseolus vulgaris*) var. Beka, infected with the former, and from broad bean var. Driemaal Wit with the latter virus. The antiserum against common mosaic gave faint agglutinations with the dialyzed, centrifuged sap of infected Beka plants during spring and autumn, but in the winter all the reactions were negative. There was distinct agglutination in spring, autumn, and winter of the sap of Driemaal Wit infected with yellow mosaic. Beka sap infected with the same virus reacted as did common mosaic. Distinct agglutination of Driemaal Wit sap infected with yellow mosaic occurred with common mosaic antiserum. Serum against yellow mosaic reacted positively

with Beka sap infected with common mosaic only when the plants were grown in autumn or spring.

From these results it is concluded that the two viruses are serologically related. The sap of Beka plants infected with one of them evidently contains a factor which inhibits agglutination of the saturated homologous or heterologous antiserum, particularly with plants grown during the winter months. Saturation of the antiserum was achieved best at room temperature. Keeping the antiserum-sap mixture of healthy plants at 37° C. for three hours may destroy the virus antibodies. Serological activity was lost after the saturated antiserum had been stored at 1° for two to three days. Common mosaic was largely associated with the solid sap components.

Thomas (W. D.) & Graham (R. W.). **Seed transmission of red node virus in Pinto Beans.**—*Phytopathology*, 41, 11, pp. 959–962, 1951.

At the Colorado A & M College, red node symptoms in Pinto beans [*Phaseolus vulgaris*] resulting from seed transmission of the virus [a strain of tobacco streak virus: *R.A.M.*, 31, p. 43] were expressed as a translucent, faint rose-dorée discoloration, originating at the base of the pulvini and extending at the optimum temperature of 27° C. to the petioles of both primary leaves, usually accompanied by stunting and culminating in the death of the plants or their rupture at the diseased node. At lower temperatures the discoloration tends to disappear and the young leaves develop a mild, chronic mottling, maturing without further symptoms unless prolonged periods of high temperature and soil moisture supervene.

Limited seed transmission [ibid., 30, p. 597] of the virus (average 1·4 per cent.) was observed in 21,424 plants grown from seed produced by currently infected beans. Seed from 25 infected U.I. No. 78 plants grown from contaminated seed gave rise to 358 plants, of which 26·5 per cent. were diseased.

There was no uniformity in the occurrence of the virus within the seeds in individual pods or among different pods on infected plants. The presence of the virus within infected seeds was not detectable by seed colour or marking.

Bridgmon (G. H.). **Bacterial blight of the Bean; methods of inoculation and varietal susceptibility tests.**—Abs. in *Univ. Wyo. Publ.*, 14, 4, pp. 63–64, 1949. [Received January, 1952.]

In studies for a postgraduate thesis (May, 1947) on bacterial blights (*Xanthomonas phaseoli* [common blight: *R.A.M.*, 31, p. 3] and *Pseudomonas medicaginis* var. [f.sp.] *phaseolicola* [halo blight: ibid., 30, p. 597, and next abstract]), which continue to be the most destructive diseases of dry and snap beans [*Phaseolus vulgaris*] in Wyoming and in most parts of the United States, seven methods of inoculation were tested on one variety of snap bean and the varietal susceptibility of ten varieties was investigated. The highest percentage of blight infection was obtained when the plants were atomized with a bacterial suspension, both in the seedling and mature stages, under conditions of high relative humidity. When time is a limiting factor and good germination is not required needling or soaking shoots in a bacterial suspension is recommended.

There was little evidence of resistance to common blight. The Wyoming Top Notch Golden Wax bean [loc. cit.] was more resistant to halo blight, at both seedling and mature stages, than any other variety tested. U.S. Refugee Number 5 and Plentiful were next, but were resistant in the mature stage only.

Burke (D. W.). **Tests of hybrid and varietal resistance and direct measures for the control of bacterial blight of Beans.**—Abs. in *Univ. Wyo. Publ.*, 14, 1–4, p. 65, 1949. [Received January, 1952.]

In this summary of a thesis (August, 1948) it is reported that of 16 hybrid lines

(comprising approximately 5,700 plants) of beans [*Phaseolus vulgaris*] tested for resistance to halo blight (*Pseudomonas medicaginis* var. [f. sp.] *phaseolicola*) and common blight (*Xanthomonas phaseoli*) [see preceding abstract], 1,481 survived the inoculation with the former and 379 showed no susceptibility to the latter. The varieties Tenderlong and Plentiful were the most resistant to common blight. King of Early Cranberry and Top Notch Golden Wax [loc. cit.] showed resistance to both blights.

Treatment at 80° C. for 35 minutes followed by new improved ceresan for 24 hrs., and also streptomycin [*R.A.M.*, 30, p. 597] (1 to 100) both proved very effective in reducing the number of diseased plants from infected seed [ibid., 31, p. 3]. Bordeaux mixture (12·75 per cent.) dust and spray, puratized spray, and Balcon's blight dust appeared to reduce infection in both mechanically damaged and undamaged plants inoculated with *X. phaseoli*.

Johnson (H. W.). **Soybean seed treatment.**—*Soybean Dig.*, 11, 7, pp. 17–20, 1 fig., 1951.

In each of four years' experiments (1947 to 1950) at the Delta Branch Experiment Station, Stoneville, Mississippi, the treatment of soy-bean seed [*R.A.M.*, 30, p. 503] with arasan and spergon at the rate of 2 oz. per bush. resulted in highly significant increases in emergence over the untreated. The slurry method of treatment with arasan SF was tested for two years and proved satisfactory. The arasan dusts also produced significantly better emergence when applied to the seed before planting in the spring.

In 1949 six treatments resulted in yields exceeding those of the untreated plots, but only arasan gave a sufficient increase (4·5 bush. per acre, corresponding to a stand increase of 23 per cent.) for statistical significance. In 1950 increases in yield for a group of eight varieties with less than 70 per cent. germination (untreated) averaged 1·3 bush. per acre with arasan, 2·4 with vancide 51, and 3·1 with spergon. The two last-named were significant and were associated with stand increases of 18 and 21 per cent., respectively. The treatments produced no yield increases in eight varieties with over 70 per cent. germination when untreated.

The outcome of tests involving two storage periods of about six months and one year after seed treatment showed that both arasan and spergon (2 oz. per bush.) help to maintain the germinability of the stored seed. The volatility of the mercurial dusts precludes their use for this purpose.

Observations in a number of places have shown that seed treatment does not seriously impair nodulation [loc. cit.] in soils where nodulated soy-beans have already been grown. In new plantings, however, seed inoculation is indispensable and its efficacy is liable to be impaired by seed treatment, which should probably, therefore, be omitted for the first crop. Where both procedures are to be practised, the seed treatment should precede the inoculation, which is done just before planting.

[In an article in the same number of *Soybean Dig.* (pp. 14 -15) the views of experts on the compatibility or otherwise of seed treatment and inoculation are summarized from their replies to a questionnaire circulated by the journal.]

Bhargava (K. S.). **Some properties of four strains of Cucumber mosaic virus.**—*Ann. appl. Biol.*, 38, 2, pp. 377–388, 1 pl., 1951.

Studies at Rothamsted Experimental Station, Harpenden, were carried out on four strains of cucumber mosaic virus [cf. *R.A.M.*, 30, p. 444]: a 'spinach strain', which caused severe chlorosis, stunting, and leaf malformation in spinach and was isolated from a local lesion produced in a tobacco leaf by an infective *Myzus persicae*; a 'primula strain' obtained from a naturally infected *Primula obconica*

plant [ibid., 31, p. 18]; and two from Dr. K. M. Smith, derived from a naturally infected turnip and a derivative of Price's 'yellow strain' [ibid., 14, p. 5]. The strains differed in host range, symptoms produced on the various hosts, virulence, aphid transmissibility, dilution end-point, and thermal inactivation point. Some hosts displayed seasonal variation in susceptibility, French bean [*Phaseolus vulgaris*] being apparently immune during summer though developing countable local lesions in winter. Different host species differ in the readiness with which the virus is transmitted to and from them; systemic infection seldom occurs in beet unless the virus is introduced into young tissues. Infectivity inhibitors in the sap of sugar beet and *Phytolacca* sp. make mechanical transmission from these to other hosts difficult.

The thermal inactivation point was 55° to 60° C. for the yellow strain and 65° to 70° for the others. The virus has a low temperature coefficient of thermal inactivation and much infectivity was lost by heating for ten minutes at temperatures under 50°. This suggests that loss of infectivity is not closely correlated with protein denaturation.

M. persicae was found to be a more efficient vector than *M. ornatus*, which in turn was more efficient than *Macrosiphum euphorbiae*. Though individual aphids caused more than one infection, most ceased to be infective in feeding periods of one to five minutes.

Kutsky (R.). **Effects of indolebutyric acid and other compounds on virus concentration in plant tissue cultures.** *Science*, 115, 2975, pp. 19–20, 1952.

In further studies at the Division of Plant Pathology, University of California, 20 compounds were tested for their effect on the virus content of plant tissue cultures [cf. *R.A.M.*, 30, p. 347]. Indolebutyric acid effectively reduced the concentration of tobacco mosaic virus in tobacco stem tissue cultures, the results of one series at 100 mg. per l. giving an average ratio of optical density per mg. tissue of 0·4 between the treated and control extracts. It was similarly effective at 10 mg. per l.

Klinkowski (M.) & Baumann (G.). **Die Nomenklatur pflanzlicher Virosen.** [The nomenclature of plant viroses.]—*NachrBl. dtsch. PflSchDienst, (Berl.)*, N.F., 5, 7, pp. 121–128, 2 diags., 1951.

Summaries are given of various proposed systems of virus classification and nomenclature [*R.A.M.*, 29, p. 602], among which the authors prefer McKinney's modification of Holmes's binomial scheme [ibid., 23, p. 427].

Maramorosch (K.). **Multiplication of Aster-yellows virus in its vector.**—*Nature, Lond.*, 169, 4292, 1 graph, 1952.

In further studies on the aster yellows virus at the Rockefeller Institute for Medical Research, New York [cf. *R.A.M.*, 31, p. 48], fluid samples from the vector *Macrosteles divisus* were injected into non-viruliferous leafhoppers at the rate of 1/8,000 ml. per insect with a specially calibrated microsyringe and the insects transferred daily to new sets of young healthy aster plants. A hundredfold decrease in virus concentration could be detected easily by the marked lengthening of incubation periods [loc. cit.]. In the seventh passage from insect to insect the shortest incubation period with inoculum at 10^{-3} dilution was 31 days for two insects, 35 for a third, and 52 for a fourth, indicating a slight lowering in concentration. Only five of the 22 insects in this passage were infective. The eighth passage gave minimum incubation periods of 23, 23, 25, 27, 29, and 29 days, respectively, showing that the concentration had not decreased and the virus must therefore multiply in the insect.

Williams (P. H.), Ebben (Marion), Read (W. H.), Smith (R. J.), Howles (R.), Messing (J. H. L.), Owen (O.), & Massey (D. M.). **Plant diseases. Chemical investigations.**—*Rep. exp. Res. Sta. Cheshunt, 1950*, pp. 20–34, 57–61, 2 graphs, 1951.

In this report [cf. *R.A.M.*, 30, p. 138] P. H. Williams describes further studies on *Didymella lycopersici* in soil, which demonstrated that when free from the competition of other fungi it can remain viable for at least six months. High soil moisture favoured its survival in an active condition and at low temperatures greatly increased the amount of the fungus present. When soil of two particle sizes (3 to 6 and under 3 mm.) was inoculated with *D. lycopersici*, incubated at laboratory temperature, and samples plated at intervals, the fine soil consistently gave rise to more colonies than the coarse. The fungus was re-isolated from inoculated steamed soil 41 weeks after inoculation, and was alive and capable of infecting tomato plants 43 weeks after the cultures had been mixed with steamed and unsteamed soil. In six of nine experiments it infected a higher proportion of plants in steamed than in unsteamed soil. In one experiment spores introduced at a depth of 4 in. below the soil surface caused no infection in plants in pots, but where the spores were 2 in. deep or on the surface all the plants were diseased. When the experiment was repeated later in the year five of five plants in surface-inoculated soil became infected, and four of five in each series with buried spores. The lower temperatures prevailing in autumn may have been more favourable to fungal growth.

In further studies on brown root rot of tomato [loc. cit.] P. H. Williams and Marion Ebben examined roots throughout the year. The fibrous root systems were better developed in steamed than in the unsteamed soil, and though small brown lesions occurred on some of the smaller roots, they were less severe and extensive than on roots from unsteamed soil. Infection by *Colletotrichum atramentarium* occurred later and was less widespread in steamed than in unsteamed soil. Fungi not previously isolated in these investigations, but found on roots from steamed soil in 1950, included *Verticillium albo-atrum*, *Thielaviopsis basicola*, *Cylindrocarpon radicicola*, and *Gelasinospora* sp. *V. albo-atrum* was not associated with wilt symptoms. The isolates from roots in steamed soil represented 27·7 per cent. of the root pieces placed on agar slants, as against 73·4 per cent. for unsteamed soil. The most commonly isolated fungi were *Fusarium* spp., *Colletotrichum atramentarium*, *Chaetomium cochlioides* and other *C.* spp., the grey sterile fungus K, and *Volutella ciliata*, the percentage isolates in unsteamed soil being 19·4, 28, 14·7, 22·1, and 8·6, respectively, with 6·3 for *Petriella asymmetrica*, the corresponding figures for steamed soil being 33, 19·5, 13·2, 12·8, 12·5, and 1·5. *Chaetomium* spp. again became less frequent when *Colletotrichum* increased. K appeared three months later in steamed soil than in unsteamed. The evidence suggests that *F.* spp. and *V. ciliata* tend to predominate in the root microflora when more active pathogens or saprophytes are absent. Isolations from brown lesions and basal rot were higher in unsteamed soil than steamed, but the proportion of *F.* isolates was higher in the latter, while *Colletotrichum* and K were less abundant, this being correlated with the less extensive development of these lesions. In corky roots the proportion of *Chaetomium* spp. was much increased in steamed soil. It would appear that corky roots are more specifically due to fungal activity than are brown lesions. In the inner rhizosphere there were much greater numbers of *Trichoderma viride* than in the outer, this applying also to *Penicillium* spp. to some extent. In root inoculation experiments (dipping the root system in a liquid culture) in steamed soil, only those plants inoculated with *Colletotrichum atramentarium* developed typical symptoms. From the roots of these the inoculant was re-isolated regularly. When *C. atramentarium* was used in combination with *Chaetomium cochlioides* or K, damage to the root system was greater than when

Colletotrichum was used alone, and though the latter was re-isolated from the roots, the other fungi were not.

W. H. Read and R. J. Smith investigating the *in vitro* fungitoxic properties of simple quinonoid and related compounds found that none of those tested was as toxic as phygon to *F. culmorum*.

R. Howles showed that the tobacco mosaic content of tomato seeds can be considerably reduced by high temperatures without detriment to the seed, though the plants are more susceptible. Malachite green [ibid., 30, p. 403] at 0·025 per cent. markedly retarded the development of tomato aucuba mosaic [strain of tobacco mosaic virus: cf. ibid., 26, p. 184] and potato virus X symptoms in tomato.

In further nutritional studies on chrysanthemum varieties J. H. L. Messing and O. Owen found that in general the reaction to acute boron deficiency was most marked in white varieties, while to a less degree incurved varieties appeared to be more susceptible than reflexed; white, incurved varieties are most acutely affected, Rose Harrison, however, being an exception. Acute manganese deficiency was associated with interveinal yellowing on the middle leaves, followed in some of the more susceptible varieties by a netting effect on the upper foliage.

D. M. Massey and O. Owen report on a chlorosis of glasshouse roses which has occurred sporadically for some years, and is on the increase. Interveinal areas of the leaves become pale green, later yellow, though the veins remain green. Affected leaves are generally small. In many cases the condition develops as the leaf grows but disappears as the flower bud opens; sometimes the flower stems weaken and the blooms are of little or no value. Analyses of the leaves and culture experiments indicated that the condition was due to lime-induced manganese deficiency [cf. ibid., 30, p. 166]. In a preliminary trial the trouble was completely corrected by adding flowers of sulphur to the beds.

Stations fédérales d'essais viticoles, arboricoles et de chimie agricole, Lausanne et Pully. Rapport d'activité 1950. [Report for 1950 on the work of the Federal Viticultural, Arboricultural, and Agricultural Chemistry Stations at Lausanne and Pully.]—*Annu. agric. Suisse*, 52, 9–10, pp. 825–952, 2 figs., 20 graphs, 1951.

The following are among the items of phytopathological interest in this report [cf. *R.A.M.*, 30, p. 599]. Vine mildew (*Uncinula necator*) appeared about 7th July, causing heavy damage in an experimental plot where preventive treatment was omitted, and in September the foliage was entirely covered with the perithecia of the fungus, against which the application of organic sulphur preparations proved useless.

About the beginning of August plum trees were severely attacked by *Tranzschelia* [*Puccinia*] *pruni-spinosae*. In spite of the extraordinarily wide distribution of the rust [C.M.I. map No. 223, and below, p. 226], its aecidial state is seldom observed. Only one report of this phase was received during 1950, on anemone de Caen [cf. *R.A.M.*, 29, p. 304] in the immediate vicinity of stone fruits in the Vevey district. *P. cerasi*, a rare species in Switzerland [ibid., 28, p. 528], was notified on cherries at Vaud and Ticino. *Didymella applanata* was exceptionally prevalent on raspberries [ibid., 31, p. 49], possibly as a sequel to a return of cold weather at the end of April.

M. Staehelin reports (pp. 909–910) further progress (accomplished with the aid of Dr. S. Blumer) in the determination of viroses and deficiency disorders of stone fruits. Some cherry trees in Ticino presented symptoms suggestive of manganese deficiency [ibid., 29, p. 516], while the condition of others was reminiscent of little leaf [zinc deficiency], though a shortage of boron is considered to be more likely. In both these cases low temperatures may also have been involved as an etiological factor. Four-year-old Burlat cherry trees at an elevation of 800 m. in the same canton were characterized by pronounced stunting; a superabundance of buds; abnormally small, markedly dentate, sometimes slightly mottled, thickened leaves, often growing in tufts; irregularly constricted lower median veins, disappearing

distally; sinuous lateral veins; enations between the latter and the midrib; and virtual or complete absence of the typical petiolar nectaries. The disease is, however, quite distinct from 'Pfeffinger' [ibid., 31, p. 128 and below, p. 245]. A young cherry stock in the canton of Geneva showed symptoms of a mild virosis resembling rasp leaf [ibid., 30, p. 167], though the Early Rivers scion, grafted in 1949, appeared to be perfectly healthy. Trees of the Bigarreau Jaboulay variety in the same canton seemed to be affected by another mild virus, probably crinkle [ibid., 25, p. 304].

A presumed virosis of peaches in Ticino is characterized by marked shortening of the branch internodes and shoots bearing rosettes of small, chlorotic, tapering leaves, while the foliage of apparently healthy branches shows an ill-defined mottling. In the canton of Vaud symptoms indicative of plum mosaic virus [cf. below, p. 245] were observed on Fellenberg damsons.

NEERGAARD (P.). **15. og sidste Årsberetning fra J. E. Ohlsens Enkes plantepatologiske Laboratorium 1 August, 1949–31 Juli, 1950.** [Fifteenth and final annual report from the J. E. Ohlsen phytopathological laboratory 1st August, 1949 to 31st July, 1950.]—33 pp., 2 graphs, 1951. [English and Esperanto summaries.]

The horticultural seed samples tested during the period under review [cf. *R.A.M.*, 30, p. 140] numbered 7,389. *Alternaria brassicicola* was again widely represented as a contaminant of crucifer seeds, being present, for instance, in 87 out of 107 lots of cauliflower, 18 out of 21 of kale, 142 out of 160 of white cabbage, 50 out of 85 of kohlrabi, 30 out of 31 of Brussels sprouts, 54 out of 62 of red cabbage, 39 out of 55 of Savoy, 25 out of 29 of sugar-loaf cabbage, one out of 28 of wallflower, three out of nine of *Iberis umbellata*, and four out of 91 of *Matthiola incana*. Two out of nine lots of tomato seed were also slightly infected by the same pathogen. All six lots of dill were infected by *Passalora kirchneri* [*Phoma anethi*: ibid., 31, p. 172]. *Stemphylium radicinum* occurred in 216 out of 335 lots of carrot. *Septoria petroselini* was isolated from 26 out of 40 samples of curled and from 17 out of 29 of root parsley, while 16 out of 42 lots of celeriac harboured *S. apii*. *Phoma betae* was detected in 56 out of 62 lots of red and in all six of the sugar beet samples examined. Among the species encountered in 198 lots of spinach were *Pleospora herbarum* [ibid., 24, p. 42] (90) and *Verticillium dahliae* (58). Of 134 lots of pea seed 85 contained *Ascochyta pisi*.

P. calvescens [or *P. papaveracea*: ibid., 31, p. 85] was found in one out of three samples of *Papaver glaucum*, all five of *P. rhoeas*, the two of opium poppy, and the one of *P. somniferum* var. *paeoniflora* inspected.

Botrytis gladiolorum on corms of *Gladiolus hybridus* [ibid., 31, p. 119] and *Microascus trigonosporus* [ibid., 28, p. 311] on aster, *Cosmos bipinnatus*, and *Foeniculum vulgare* seeds (in the germinator) are among the new records for Denmark, besides those already noticed.

In small-scale seed disinfection experiments the incidence of a species of *Fusarium* deleterious to asparagus seed was reduced, without adverse effects on germination, from 49·8 to 0·3 per cent. by one hour's immersion in 0·5 per cent. germisan and to 2·8 per cent. by dusting with tillantin 1875 (4 gm. per kg., shaken for five minutes). Six hours' soaking in 0·25 per cent. germisan severely impaired germination of carrot seed and barely sufficed to eliminate *Stemphylium radicinum*. *S. r.* var. *petroselini* on parsley seeds withstood six hours' immersion in 0·25 per cent. germisan or three hours in 0·5 per cent.

SAREJANNI (J. A.), DÉMÉTRIADÈS (S. D.), & ZACHOS (D. G.). **Rapport sommaire sur les maladies des plantes observées en Grèce en 1950.** [Brief report on the plant diseases observed in Greece during 1950.]—*Ann. Inst. phytopath. Benaki*, 5, 1, pp. 12–14, 1951.

This report [cf. *R.A.M.*, 31, p. 172] includes the following new record for

Greece; *Pseudomonas savastanoi* f. sp. *nerii* on oleander [ibid., 25, p. 493] at Kiphissia.

Plant diseases.—*Agric. Gaz. N.S.W.*, 62, 6, pp. 305–309, 7 figs., 1951.

Woodiness or mosaic disease virus [cucumber mosaic virus] is present in almost every year-old passion fruit [*Passiflora edulis*] vine in New South Wales [*R.A.M.*, 27, p. 533]. Householders who grow a few vines for home use are advised to plant a new vine in a warm situation early every summer, old vines being discarded as soon as they begin to become unproductive.

In carrot crops grown for seed the peduncles and pedicels of plants affected by carrot virus [ibid., 30, p. 598] are stunted and the seed heads malformed. The leaves are distorted and show a yellow-green mottle. It is now thought that the premature rotting of roots of seed plants and their failure to set seed are often due to this disease.

New plant diseases.—*Agric. Gaz. N.S.W.*, 62, 8, p. 414, 1951.

From January to June, 1951, the following plant diseases were recorded for the first time in New South Wales: chrysanthemum stunt mottle virus [*R.A.M.*, 28, p. 126], *Puccinia cichorii* [ibid., 27, p. 114] on chicory, tomato big bud virus (rosette) disease on *Crotalaria juncea*, *Monochaetia unicornis* on *Cupressus sempervirens* [ibid., 28, pp. 246, 444; 31, p. 8], and *Ustilago rabenhorstiana* on *Digitaria sanguinalis* [ibid., 22, p. 362].

Wallace (G. B.). **Annual Report of the Plant Pathologist, 1949.**—*Rep. Dep. Agric. Tanganyika, 1949*, p. 115, 1951.

The more important plant diseases recorded in Tanganyika [cf. *R.A.M.*, 30, p. 509 and next abstract] during the year were 'woodiness' [cucumber mosaic virus: ibid., 30, p. 309] established in old passion fruit vines [*Passiflora edulis*] at Lushoto and near Moshi; *Armillaria mellea* on (new host records) young *Ocotea usambarensis*, *Pinus patula*, *Casuarina* sp., wattle (*Acacia melanoxylon*) [ibid., 30, p. 141], and camphor (*Cinnamomum camphora*); and rust (*Uromyces aloës*) [ibid., 26, p. 355] on *Aloë* plants growing in overcrowded conditions with excessive moisture and shade.

Wallace (G. B.) & Wallace (Maud M.). **Tanganyika fungus list: recent records No. XV.**—*Mycol. Circ. Dep. Agric. Tanganyika* 31, 6 pp., 1951.

The new plant disease records for Tanganyika in this circular [cf. *R.A.M.*, 30, p. 490 and preceding abstract] include an unusual form of tobacco angular leaf spot (*Pseudomonas angulata*) [ibid., 30, p. 510] from near Songea, characterized by very large, round spots, sometimes with concentric rings, which may be confused with *Cercospora* or *Alternaria* lesions, but they lack the pale centre typical of the former.

A disease of tree tomato [*Cyphomandra betacea*] at Lyamungu and also near Moshi and Arusha was found by Dr. K. M. Smith to be due to the two components of tobacco rosette virus [ibid., 26, p. 318], *C. betacea* probably being the first proved host of this virus complex besides tobacco [cf. ibid., 18, p. 347]. The leaf veins were yellow, distorted, and of uneven width, with much brown corky tissue alongside. Some leaves were misshapen or lopsided through uneven growth.

Septoria leaf blotch (*S. tritici*) [ibid., 30, p. 514] occurred on wheat in the Southern Highlands Province.

A wilt of French beans [*Phaseolus vulgaris*] in the Northern Province was due to *Pythium ultimum* [C.M.I. map No. 202; *R.A.M.*, 30, p. 419]. *Ascochyta phaseolorum* [ibid., 31, p. 208] was also recorded. *A. cynarae* [ibid., 15, p. 771] caused a leaf spot of globe artichoke.

Nectria rubi [ibid., 14, p. 585] and its conidial state *Cylindrocarpon janthothele* were present on cyclamen plants killed in wet, undrained soil, but the degree of pathogenicity is uncertain.

New host records include *Puccinia pruni-spinosae* on almond [cf. above, p. 223] and *Gibberella zeae* on wheat [ibid., 30, p. 630].

Miller (P. R.) & O'Brien (Muriel). **The plant disease warning service in 1951.**—*Plant Dis. Reptr, Suppl.* 208, pp. 237–251, 22 maps, 1951. [Multilithed.]

During 1951, of the diseases under consideration in the Crop Plant Disease Forecasting Programme covering part of Canada and the United States [cf. *R.A.M.*, 30, p. 451] the most widespread and active was late blight of potato and tomato (*Phytophthora infestans*). Tomato blight [ibid., 31, p. 35] continued its north-westward movement across the northern States, but was absent from commercial greenwrap acreages in Mississippi planted with home-grown plants rather than imported ones. Its widespread activity in the eastern Provinces of Canada probably resulted from the favourable weather conditions which prevailed throughout the area during summer. Losses in some instances might have been heavier than in 1950 but for the good or excellent control given by fungicides [loc. cit.], which included dithane, parzate, fixed coppers, Bordeaux mixture, nabam plus zinc sulphate, tribasic copper sulphate, zineb, copper A, and the carbamates. Potato blight [ibid., 31, p. 52] also continued its north-westward advance.

A field outbreak of tobacco blue mould (*Peronospora tabacina*) [ibid., 31, p. 150] occurred in Connecticut, where shade growers sustained a loss of 10 per cent. of the crop value. Seed-bed damage in the State was low and as a result growers relaxed their control efforts. Though spread in the field is unusual a cool, wet, early summer afforded ideal conditions for an epidemic. Control programmes were begun too late and too little material was used. In other areas, despite the above-normal January temperatures, the disease was kept at a low level by light rainfall, average spring temperatures, and control measures.

A feature of cucurbit downy mildew (*Pseudoperonospora cubensis*) [ibid., 31, p. 165] was the absence of its usual progressive northward development; losses from the disease were at a minimum.

Tables are appended giving details of spray programmes used and the general results obtained.

Department of Botany.—*Rep. Mass. agric. Exp. Sta., 1949–50* (*Bull.* 459), pp. 20–26, 1950. [Received 1951.]

In this report [cf. *R.A.M.*, 29, p. 605] W. L. Doran states that cabbage club root [*Plasmodiophora brassicae*: see above, pp. 195, 216] was severe in all untreated soils, but no disease occurred in loam sand (1:1 or 1:2) treated with mercurous chloride plus hydrated lime; in loam alone there was 30 per cent. club root. Mercurous chloride was more effective at 0·3 than at 0·2 gm. per sq. ft. but the growth of plants was retarded during the early growth. Under some conditions ground limestone (5,600 lb. per acre) was successfully substituted for hydrated lime for use with mercuric and mercurous chlorides (33 lb. per acre) and eliminated club root.

Of five soils tested by L. H. Jones for the presence of the factor causing tobacco frenching only two, both from moist areas, were positive, inducing symptoms in seven to eight days. In similar soils at relatively high soil temperatures certain chlorotic conditions, sometimes accompanied by leaf deformities, appeared in weeds and winter squash (*Cucurbita maxima*). The application of nitrogenous compounds to the soil or spraying tobacco plants with the nitrogen-containing substance nugreen [ibid., 30, p. 234] demonstrated that true frenching is not a nitrogen deficiency reaction. In experiments by L. H. Jones and W. H. Weinstein two sets of tobacco plants in two containers were placed in adjacent water baths

at 21° C. so that an inarch graft could be performed between one plant in one set and another in the adjacent container. Fourteen days later the soil temperature of one container was raised to 35°. On the sixth day frenching symptoms appeared in both the ungrafted and the grafted plant at the high soil temperature and on the eighth day the first symptoms appeared on the grafted plant at 21° and continued to develop for many days. None appeared on the ungrafted plants at this temperature.

E. F. Guba states that tomato No. 44 B 292, possessing a factor for immunity from leaf mould (*Cladosporium fulvum*), was crossed with the highly resistant Improved Bay State [ibid., 30, p. 361]. Selection for immunity and commercial characters in the third generation is now in progress.

The release is announced of the carnation seedlings Mrs. E. F. Guba (10 W: John Briry × Dorothy Napier), Autumn Glow (63 W: Elizabeth Rowe × Helen Hussey), Waltham Pink (48 W: John Briry × Dorothy Napier), and Regal Pink (46 W: Puritan × Helen Hussey), which on the basis of artificial inoculation studies appear to be resistant to *Fusarium dianthi* [ibid., 30, p. 568]. Phenyl mercury acetate (¼ teaspoonful to 1 gal. water) is recommended for the disinfestation of untrimmed cuttings, followed by removal of the base to the next node if bacterial wilt (*Phytomonas* [*Pseudomonas*] *caryophylli*) [ibid., 30, p. 321] is a factor; parzate, zerlate, fermate, or bioquin copper 8 may be used for *F. dianthi* [ibid., 30, p. 468]. As no consistent control of *Rhizoctonia* [*Corticium*] *solani* [ibid., 30, p. 418], the principal cause of heavy losses of young plants, could be obtained by chemical soil treatment, N. W. Butterfield (p. 51) recommends better cultural practices, including soil sterilization.

E. F. Guba states that as the result of many years' study he recognizes about 36 species of Monochaetiae and 252 of Pestalotiae.

Welch (F. J.). **Year's record of research in Mississippi farm problems. Highlights of the work of the Mississippi Branch Experiment Stations during the fiscal year ended June 30, 1949.**—*Miss. Fm Res.*, 12, 8, pp. 3–8, 1 fig., 1 map, 1949. [Received September, 1951.]

In 1948–9 at the Truck Crops Branch Experiment Station, Crystal Springs, Mississippi, a large majority of the 100 tomato lines developed at the Station and 50 others grown in observation plots possessed resistance to *Fusarium* wilt [*F. bulbigenum* var. *lycopersici*: cf. *R.A.M.*, 31, p. 35]. There are indications that some sources of Pan America are susceptible. Applications of 20 lb. borax per acre, applied in the complete fertilizer, are recommended for cabbage and cauliflower to reduce brown core in the centre of the cabbage heads caused by boron deficiency in the soils of Copiah county; in some cases 10 lb. of borax per acre increased spinach yields. Considerable control of tomato buckeye rot [*Phytophthora parasitica*: cf. ibid., 28, p. 36] has resulted from a regular spray programme; a preliminary test in spring, in which the plants were mulched and the mulch sprayed, gave promising results. Dipping sweet potatoes in a fungicide before setting to prevent stem rot [*F. bulbigenum* var. *batatas*: cf. ibid., 29, p. 81; 30, pp. 137, 312] greatly increased yields in the absence of the disease.

At the Delta Branch Experiment Station, Stanton, Victorgrain and Fulgrain oat varieties remained undamaged by a severe epidemic of crown rust [*Puccinia coronata*: ibid., 31, pp. 180, 235]. No fireblight [*Erwinia amylovora*: cf. ibid., 29, p. 290] was observed on the parent tree of the Mississippi 1 apple (apparently a seedling) or on the young trees set in the orchard in 1947.

Stout (G. L.). **Bureau of Plant Pathology.**—*Rep. Dep. Agric. Calif., 1950* (*Bull. Dep. Agric. Calif.*, 39, 4), pp. 236–250, 1 fig., 1950.

In this report [cf. *R.A.M.*, 29, p. 500] C. G. Weigle states that of 490,871 peach

trees inspected in 1950, 1,859 were newly affected by mosaic, 162 properties being infected for the first time. All diseased trees found were removed or killed as soon as possible. Twenty-one peach trees infected with yellow bud mosaic virus [ibid., 26, p. 530] on a property in San Bernardino county were destroyed. No others were detected in the neighbourhood.

R. L. McClain reports that rapid spread of citrus quick decline [ibid., 31, p. 62] was observed for the first time in several localities in the heavily infected area of Orange county; lightly infested parts of Orange, Los Angeles, and San Bernardino counties showed a slow, steady build-up of infection. In the regulated or outer zone of the quarantine area [ibid., 29, p. 500] a few additional suspect trees were found on properties on which some had been observed in 1949. The presence of the disease in Ventura county was confirmed by transmission tests. Quarantine lines were extended as from 28th August and all species of the subgenus *Eucitrus*, including ornamental forms and any hybrid with an ancestor of any such species, were included as restricted plants from 22nd November, 1950.

D. M. Coe states that *Corticium fusiforme* [*C. fuciforme*: ibid., 24, p. 105; 28, p. 294] occurred in a bluegrass [*Poa pratensis*] lawn in Santa Rosa in early November; the fungus is rare in this area. A specimen of onion smut (*Urocystis cepulae*) [ibid., 29, p. 500] was received from King's county.

On p. 219 of this report A. P. Messenger states that the Elm Tree Diseases Exterior Quarantine (Section 3267, C.A.C.) has been amended as from 19th December, 1950, to add Alabama and Georgia, where phloem necrosis [cf. ibid., 29, p. 65] now occurs, and Michigan and New Hampshire, where Dutch elm disease [*Ceratostomella ulmi*: cf. ibid., 27, p. 63; 30, p. 294] has been found. The Oak Wilt [*Chalara quercina*: ibid., 30, p. 312; 31, p. 37] Disease Exterior Quarantine (Section 3269, C.A.C.), effective as from 5th May, 1950, to prohibit the entry into California of rooted oak trees and seedling plants from any infected State, was amended as from 19th December, 1950, to include Arkansas, Nebraska, Ohio, and Pennsylvania.

Rapport du conseil de l'expérimentation et des recherches agronomiques en Algérie pour 1950–1951. [Report of the council for agronomic experimentation and research, Algeria, for 1950–1951.]—212 pp., 1951.

On p. 39 of this report it is stated that one of the Leroy hybrid wheat collections obtained from the C^{ie} Algérienne showed some resistance to lodging and to the Kalèche strains of smut [*Ustilago tritici*: *R.A.M.*, 16, p. 661; 30, p. 460].

The following items occur on pp. 144–161. Gassner's method [ibid., 29, p. 612] was adopted for the treatment of Baroota wheat seed infected with spores of bunt (*Tilletia foetida*) [ibid., 31, pp. 108, 110] at 0·6 per 1,000. The results demonstrated the marked superiority of the mercury compounds, particularly the organic mercurials at 0·5 gm. or 3 gm. mercury per quintal of seed in the wet (15 minute steep) and dry (200 gm. per 100 kg. seed) treatments, respectively. Steeps containing 0·3 per cent. formaldehyde (10 minutes) and dusts having a tetrachlorobenzoquinone base were equally effective. All three materials gave 100 per cent. control of bunt by the above method. In field experiments using the same variety infected chiefly with *T. foetida* 98 per cent. tetrachloroparabenzoquinone dust and 17 per cent. benzene hexachloride dust gave almost 100 per cent. control. In general the immersion treatments gave better control than the dusts. With spore contaminations at the rate of 0·4 and 0·6 per 1,000 the organic mercurials (containing 0·035 per cent. mercury) and copper sulphate (0·25 per cent. copper) gave near perfect control. Formalin (0·5 per cent.) was effective only at the lower spore load. When inoculated grain was used Baroota 8,791 proved the most susceptible variety tested (average of 26·4 per cent. infection in five localities) followed by Mahon 57 (15·44), Pusa Florence 9,290 (7·02), Aegilops 14,257 (6·92), Florence Aurore 8,189 (4·93), and Pusa Florence 380 (4·73) [ibid., 30, pp. 221, 514].

In experiments on the control of vine *Oidium* [*Uncinula necator*: ibid., 29, p. 138] wettable sulphurs were more effective at Tipaza and Fondouk and pure sublimated sulphur at El Ançor and Mazagan, the materials being used at 66 and 69, and 124 and 180 kg. per ha., respectively. The results of these experiments and of those in previous years permitted the establishment of a control programme for pilot plots. On the whole perfect control was obtained with only 60 per cent., at the most, of the amounts of sulphur used by neighbouring vine-growers. This programme envisages the use of polysulphides at the beginning of the season, wettable sulphurs until the middle or end of May, and, finally, pure or diluted sulphur dusts according to the temperature or disease intensity.

Studies were made of an infectious disease occurring on Mostaganem sand. Healthy Rupestris du Lot grafted on infected stocks appeared normal until May but thereafter developed all the symptoms of infectious degeneration [court-noué: ibid., 29, p. 348], which became more acute at the end of the season. Budding also transmitted symptoms to healthy plants.

Chick pea [*Cicer arietinum*] strains at the Central Station of the Agricultural Institute suffered considerably from anthracnose [*Ascochyta rabiei*: C.M.I. map No. 151] after a wet spring, 109 lines being completely destroyed. Lines 99/21, 21, and 142 showed some resistance, yielding 7, 8, and 13 qx [quintals] per ha. compared with 0 to 3 or 4 quintals per ha. for other varieties.

Jacobs (S. E.) & Mohanty (U.). **Studies in bacteriosis, XXVII. Factors influencing infection by Corynebacterium fascians (Tilford) Dowson.**—*Ann. appl. Biol.*, 38, 1, pp. 237–245, 1 pl., 1951.

The pathogenicity of 22 strains of *Corynebacterium fascians* [*R.A.M.*, 31, p. 56] to Punjab 7, a pure line of gram (*Cicer arietinum*), and to sweet peas, inoculated without wounding by bacterial suspensions in sterile water, was tested in the Bacteriological Laboratory, Imperial College of Science and Technology, London. *C. arietinum* was shown to be a new host for the bacterium. Of 13 infective strains 11 also attacked sweet pea [ibid., 30, p. 417], 12 S and 12 R having lost their original infectivity for the latter host. The nine strains which were unable to cause fasciation of gram included three recent isolations (S 5 S, H 8 S, and A 9 S), which failed to infect sweet pea, and V 10 S, which had given good results on this host. The S[mooth] and R[ough] variants of the same strain behaved similarly towards a given host. The highest rate of infection for sweet pea was 67 per cent. Adventitious roots appeared on sweet pea plants inoculated with strains 2 S, H 8 S, A 9 S, and V 10 S; of these 2 S and V 10 S caused fasciation as well and 2 S caused gram to produce adventitious roots.

In infection studies on the aerial parts of sweet pea plants inoculation of dormant buds with strain 2 S invariably caused infection whereas cotyledonary bud inoculation often failed. Wounding had no effect in facilitating internode infection.

In the presence of *Bacillus mesentericus* the incidence of infection of sweet pea seedlings in sand cultures by strain 2 S was only about half that in the control (without the antagonist). *B. subtilis* had no effect. When nutrients were added in the form of soil extract, however, the percentage infection was slightly higher with the antagonists than in the control.

Leifson (E.). **Staining, shape, and arrangement of bacterial flagella.**—*J. Bact.*, 62, 4, pp. 377–389, 4 pl., 1951.

This method for staining bacterial flagella, developed by the author at the Stritch School of Medicine and Graduate School, Loyola University, Chicago, is a modification of that already described (*J. Bact.*, 20, pp. 203–211, 1930). The stain consists of 0·5 gm. sodium chloride, 1 gm. tannic acid, 0·3 gm. para-rosaniline acetate, 0·1 gm. para-rosaniline hydrochloride (the para-rosaniline mixture may

be replaced by basic fuchsin), 33 ml. 95 per cent. ethyl alcohol, and 67 ml. distilled water. The function of each ingredient is discussed and detailed directions are given for the preparation of the bacteria and smears. A counterstain of 1 per cent. water solution of methylene blue or ordinary Loeffler's methylene blue diluted with several volumes of water plus a small amount of alkali may be required. On the basis of flagellar shape and arrangement, bacteria are classified into three main groups, and illustrated by photographs.

Shishelova (Mme N. A.). Образование протопектиназы различными представителями фитопатогенных бактерий. [The production of protopectinase by various representative phytopathogenic bacteria.]—Микробиология [*Microbiology*], 20, 5, pp. 430–433, 1951.

Xanthomonas malvacearum, *X. phaseoli*, *X. translucens*, *Pseudomonas atrofaciens*, *P. mori*, and *Bacterium beticola*, studied at the Moscow Department of the Pan-Soviet Institute of Agricultural Microbiology, were found to secrete protopectinase only when grown on artificially infected French bean [*Phaseolus vulgaris*], wheat, cucumber, tomato, mulberry, and beet plants, respectively, and not in culture under artificial conditions [cf. *R.A.M.*, 31, p. 9]. *Erwinia carotovora*, *B. polymyxa*, *X. campestris*, and *P. lacrymans* (this last on solid substrata only) were able do so in culture. *B. tumefaciens* on artificially infected tomatoes and beets and *Apl* [*anobacter=Corynebacterium*] *michiganense* on tomato stems and fruits were not able to produce protopectinase in these experiments.

Ark (P. A.) & Scott (C. E.). **Elimination of crown gall.**—*Calif. Agric.*, 5, 7, p. 3, 4 figs., 1951.

Crown gall (*Agrobacterium* [*Bacterium*] *tumefaciens* [*R.A.M.*, 27, p. 276; 31, p. 69] is of economic importance in almond, peach, and walnut orchards in California. The incidence of the disease can be reduced by careful cultivation to avoid bruising or injuring the root system. A popular method of control consists in painting the surface of the gall in autumn or winter with an elgetol-methanol solution (20 per cent. elgetol and methanol 1:4, or 30 per cent. elgetol-methanol 1:6½) [ibid., 30, p. 373; 31, p. 106]. Severe injury has occurred on almond trees treated by this method during hot weather. Galls should first be cleaned thoroughly with a brush and the application of the mixture should extend ½ to 1 in. over the bark beyond the margin of the gall. All wounds made during preparation for treatment should be disinfected with the same solution and covered with a good seal. On walnut a preliminary scraping of all galled tissue and about 1 in. beyond the margin of the gall is necessary. The treatment, while impracticable on old trees with large encircling galls, is of great value in young orchards.

Hodgson (R.), Peterson (W. H.), & Riker (A. J.). **Inhibition of crown-gall bacteria by D-tryptophan and its reversal by an unidentified metabolite.**—*J. Bact.*, 62, 4, pp. 445–458, 4 graphs, 1951.

In experiments carried out in the Departments of Biochemistry and Plant Pathology, College of Agriculture, University of Wisconsin, Madison, DL-tryptophane inhibited the growth of six strains of the crown gall bacterium (*Agrobacterium* [*Bacterium*] *tumefaciens*) [*R.A.M.*, 29, p. 294; 30, pp. 335, 482; 31, pp. 106, 175], viz., strain A6 [ibid., 30, p. 406], two mutants from it, a related strain, and hop and peach [loc. cit.] strains, in a modified sucrose-mineral salts medium at 26° C. with mechanical shaking. Parallel experiments with an attenuated mutant (A6–6) and the virulent A6 indicated that the former was much less susceptible to inhibition than the latter. The inhibition, which was very severe at high concentrations, was due to the D-isomer, and was reversed by a yellowish-brown pigment which

formed when L-tryptophane was included in the medium. Xanthurenic acid and 3-hydroxyanthranilic acid partially reversed the inhibition, while of the crude substances tested an extract of crown gall bacteria grown in a medium containing L-tryptophane had the greatest reversing activity.

Annual Report West African Cacao Research Institute. April, 1949 to March, 1950. 84 pp., 1951. 5*s*.

In the virus research section (pp. 9–33) of this report [cf. *R.A.M.*, 30, p. 457] it is stated that two new cacao viruses were noted during 1949–50. One is common in the Peki area of the Volta River district of the Gold Coast, where a few outbreaks, now covering 100 acres, have been known since 1942. The only symptom is a swelling of the twigs (conspicuous, but infrequent), chupons (rare), and roots. The other virus or one similar to it was found in excellent cacao country near Bompata in Ashanti Akim, and near Obogu, Banso, Bankame, Asuboa, Dampong, Tomento, and Agrafi, covering about 300 sq. m. in Ashanti Akim. Individual outbreaks near Bompata, though never more than a few hundred yards apart, were very small, of not more than three dozen trees. There were no swellings and leaf symptoms occurred on occasional flushes, usually as a close yellow banding of scattered portions of the secondary and tertiary veins; symptom-bearing leaves were not reduced in size. Infected trees were not debilitated. Only two viruses are known which, in addition to the Peki virus, do not normally produce leaf symptoms; one occurs near Bisa in the Volta River area, the other near Agogo in Ashanti Akim. The three are unlikely to be closely related. The Bompata virus resembles the Kpeve (Togoland) [ibid., 25, p. 441], Asalu (Nigeria) [ibid., 30, p. 218], and Alaparun (Nigeria) [loc. cit.] viruses in not producing stem symptoms, but the leaf symptoms are quite different.

The Konongo (Ashanti Akim) and Kongodia (Eastern Ivory Coast) [ibid., 25, p. 295; 29, p. 252] viruses were unable to produce symptoms in seedlings already infected with a mild strain of virus 1A [ibid., 30, p. 219]. The Western Province viruses [ibid., 30, p. 457] are notable for their multiplicity; a complex protection test with seven of them indicates so far that they are not related immunologically.

Annual records of the unrestricted natural spread of virus 1A in a demonstration plot were continued [ibid., 30, p. 218]; by March, 1950, infected trees had reached 90 per cent.

A test is in progress to determine whether mild strain infection of trees results in effective immunity from subsequent infection with a virulent strain of the same complex, as normally happens with young cacao. Experimental plots were laid out of peasant-planted Amelonado cacao comprising 1,738 trees some of which were infected with mild strain 1A in July, 1947, by patch grafting, followed by graft-inoculation of perimeter trees with the virulent strain in March, 1948. Results to date suggest that pre-infection with the mild strain has an inhibiting effect on rate of spread of a severe strain of the same complex. In a recent analysis the mean percentage of trees considered to be infected by the severe strain (as shown by twig swellings) was only 6·1 in the pre-inoculated plots, as compared with 31·2 per cent. of the trees not pre-inoculated.

Transmissions from infected seedlings kept in the light and total darkness showed that virulent virus 1A was capable of retaining its virulence for at least four months in total darkness. The essential activity of this virus appears to take place at a level deeper than the chloroplast system, though there was no indication that other phases of the plastid and related systems are not of critical importance. Symptom production appears to be a secondary effect. No instance of attenuation of virus 1A by high temperatures was observed, and attempts to denature it in living plants by the use of chemicals resulted at the most in only minor effects on symptom expression. Some mild strains of 1A appear more efficient than others in

immunizing plants against at least some virulent strains. In a test to ascertain whether five randomly chosen virulent isolates from the Eastern Province, Gold Coast, were immunologically related, five groups of five saplings, already infected for 17 months with an almost symptomless Eastern Province strain, were each inoculated by patch grafting with one of the five virulent viruses; a sixth group (control) was not reinoculated. Immediately afterwards all the plants were coppiced to two feet. After the first two flushes of new growth had matured symptoms of the virulent virus were present on some of the test plants of each group. In the later flushes of four of the groups virulent virus symptoms did not appear, or appeared only on occasional flushes. Plants of the fifth group did not recover. In previously healthy saplings, inoculated with the virulent viruses only, symptoms were present on the leaves of every flush and growth was much retarded. A year later it seemed that the introduced virus had been completely or almost completely suppressed in groups one to four, and the plants were again coppiced. Three months later virulent virus symptoms were observed on only one of the plants. Work on immunity breakdown is continuing, but it is already clear that mild strain-induced immunity to virulent strains is not the absolute condition it has hitherto been assumed to be. The existing concept of induced immunity requires revision.

Cacao of Upper Amazon origin was ascertained to be comparatively more resistant to severe virus 1A and also more tolerant of infection by it than was West African Amelonado. In tests of the host range of the cacao viruses infection by virus 1A was obtained on *Erythropsis barteri*, *Sterculia rhinopetala*, and *S. tragacantha* [cf. ibid., 29, p. 608].

In the section on mycology (pp. 57–65) it is reported that Bordeaux mixture reduced the incidence of black pod (*Phytophthora palmivora*) [ibid., 30, p. 456] to 1·9 per cent., as compared with 14·6 per cent. for the unsprayed, 11·5 for weekly harvesting, and 2·7 for perenox. The greatest weight of good wet beans per pod was given by weekly harvesting (3·81 oz.), Bordeaux, perenox, and the control giving 3·5, 3·58, and 3·32 oz., respectively.

A comprehensive pod classification investigation, intended to continue for several years, was begun in 1949 with the object of estimating the extent of pod damage and the loss caused by various agents in relation to environmental factors. Records from July to December, 1949, during which period over 90 per cent. of the season's crop was harvested, showed that black pod was of overwhelming importance, the percentage of pods damaged each month being 32, 40·3, 15·8, 11·9, 2·6, and 1·8, respectively. Incidence of brown pod (*Botryodiplodia theobromae*) [ibid., 30, p. 457] varied with incidence of rodent damage. In inoculation experiments with *Calonectria rigidiuscula* [loc. cit.] into cacao and other plants none showed any marked resistance compared with West African Amelonado. *C. rigidiuscula* was found capable of acting as a wound parasite towards the following species (arranged in order of decreasing apparent susceptibility as judged from mean length of 20 lesions): *Cola cordifolia*, cacao, *Bombax buonopozense*, *Triplochiton scleroxylon*, *Ceiba pentandra*, *Cola acuminata*, *Cola togoensis*, *Ptergota macrocarpa*, *Desplatsia lutea*, *Sterculia rhinopetala*, and *S. tragacantha*. In a second trial the following were susceptible (in comparable order): *Celtis zenkeri*, *Milletia irvinei*, cacao, *Pseudospondias microcarpa*, *Picralima nitida*, *Khaya grandiflora*, *Conopharyngia* sp., *Newbouldia laevis*, *Glyphaea laterifolia*, *Erythrina altissima*, and *Spathodea campanulata*.

It is stated on p. 68 that as a result of preliminary experiments the use of sodium arsenite has been adopted as a routine measure at Tafo for the removal of redundant forest trees, alternative hosts of cacao viruses. A strongly alkaline, concentrated solution diluted to 10 per cent. with starch paste is inserted into a girdle cut in the tree.

Hanna (A. D.), Heatherington (W.), & Judenko (E.). **Control of the mealybug vectors of the swollen shoot virus by a systemic insecticide.**—*Nature, Lond.*, 169, 4295, pp. 334–335, 1952.

Field and laboratory experiments by a team of Pest Control, Ltd., at the West African Cacao Research Institute, Tafo, Gold Coast, showed that CR 409, a systemic insecticide containing bisdimethylamino-fluoro-phosphine oxide, gave the best control of the mealybugs *Pseudococcus njalensis* and *P. citri*, the principal vectors of cacao swollen shoot virus [see preceding abstract], when applied to the soil directly round the trunk of the trees in a shallow trench, at a dosage based on a girth-weight correlation. On 500 naturally infested treated trees only 35 mealybugs were present six weeks later, as against 42,971 counted before treatment on the untreated portion. Three treatments at intervals of eight weeks gave 99·4 per cent. reduction and kept the numbers of insects at a very low level. The treatment was not injurious to pollinating insects or to parasites and predators.

Oswald (J. W.) & Houston (B. R.). **A new virus disease of cereals, transmissible by aphids.**—*Plant Dis. Reptr*, 35, 11, pp. 471–475, 1 fig., 1951. [Multilithed.]

Barley yellow dwarf, a new virus disease of cereals, which has in past years affected only scattered plants, was responsible for the widespread failure of the barley crop in California in 1951. The disease differs from most other known virus diseases of cereals in that there are no mosaic symptoms, but a brilliant yellowing of the leaves accompanied by moderate to severe stunting of the plants, and it is not mechanically transmissible. It is transmitted readily by aphids. In greenhouse experiments with aphids collected in the field *Rhopalosiphum maidis*, *R. prunifoliae*, *Macrosiphum granarium*, and *M. dirhodum* were found to be vectors. Large flights of aphids in the Sacramento Valley in March when, owing to unusually late planting, barley and other cereals were mostly very young and susceptible to acute damage, are believed responsible for the sudden development of yellow dwarf over a wide area within a few days in mid-April. Transmission experiments showed that a stunting and chlorosis of wheat and a reddening of oats observed in the field were due to the same virus.

Litzenberger (S. C.). **Reaction of cereal varieties to smuts in Alaska.**—*Plant Dis. Reptr*, 35, 11, pp. 482–484, 1951. [Multilithed.]

Results are given of the 1950 and 1951 cereal smut tests at the Matanuska Station, Palmer, Alaska, when barley, oats, and wheat were inoculated, respectively, with *Ustilago hordei*, *U. kolleri* and *U. avenae*, and *Tilletia caries* and *T. foetida* [*R.A.M.*, 30, p. 101; 31, p. 58]. Responses to smuts collected and tested under Alaskan conditions did not differ essentially from those reported for the same varieties tested in other spring cereal growing areas. No infection was recorded for the most resistant strains of barley (Alaska Black, Machine Barley, Himalaya, and Pannier) or oats (Vicland, Goldwin, Overland [ibid., 31, p. 180], and Cherokee), while the average percentage of infected heads for Lee, the most resistant wheat, was 17·1. The oat varieties Mission, Fortune, Gopher, and Larain averaged less than 3 per cent. infection, but Gopher is the only one of these recommended for Alaska.

Black stem rust (Puccinia graminis) in Europe in 1951.—*Misc.* [*Publ.*] *Europ. Plant Prot. Organ., Paris*, 2, 3 pp., 1952. [Mimeographed.]

In 1951 no widespread attacks of *Puccinia graminis* occurred in Schleswig-Holstein, Germany [*R.A.M.*, 30, p. 28], although in Denmark the disease is reported to have been more extensive and serious than in any year since 1901 [ibid., 31, p. 171], the only outbreaks during this period having occurred in 1937 and 1938

[ibid., 18, p. 88; 22, p. 90]. The 1951 attack was confined almost entirely to wheat, all parts of the country being affected, particularly the island of Bornholm, where the loss of grain was estimated at 40 to 50 per cent. Surveys showed that the barberry has spread widely, and a new eradication campaign has been organized.

In France [ibid., 26, p. 290] outbreaks on wheat were comparatively moderate. The high altitude cereals grown in the Jura Mountains suffered most, as their development was much delayed and they were exposed to late attacks.

No infection was reported from Jersey. In Great Britain [ibid., 6, pp. 392, 405, 596; 7, p. 490; 24, p. 176] the disease was somewhat more common than usual. There is some evidence that epidemics, at least in south-western England, are correlated with weather conditions favourable for the wind-borne carriage of uredospores from north Africa.

In Switzerland [ibid.. 28, p. 165] a particularly severe attack occurred during the summer on several varieties of Italian wheat in Ticino. In Grisons there were a number of severe local attacks on wheat and rye, in which almost every plant was damaged. Moderate attacks on winter wheat and rye were recorded throughout the Swiss Plateau between the Alps and the Jura Mountains. The primary and decisive factor in all these outbreaks was the presence of barberry bushes, no steps for the eradication of which have yet been taken.

In Finland [cf. ibid., 5, p. 190] outbreaks were the most severe so far recorded. Losses of spring wheat throughout the south-west are estimated at 20 to 30 per cent. Legislative action is to be taken in 1952 to eradicate the barberry, which, though not thriving naturally in Finland and uncommon as an ornamental plant, is still found in gardens, mainly in the south and south-west.

Lowther (C. V.). **Seedling resistance vs. adult-plant susceptibility of Mentana Wheat to race 15 B of Puccinia graminis tritici.**—*Plant Dis. Reptr*, 35, 11, pp. 480–481, 1951. [Multilithed.]

During the winter of 1950–1 4,000 wheat lines were inoculated in the seedling and adult stages in greenhouse tests at Beltsville, Maryland, for reaction to race 15 B of *Puccinia graminis tritici* [*R.A.M.*, 30, p. 604; 31, p. 110]. Of the 134 lines from crosses between Mentana (C.I. 12448) and Kenya (C.I. 12882, C 9906), 34 were already susceptible in the seedling stage, 38 were resistant in both stages, and 62 were resistant in the seedling stage but susceptible at maturity [cf. ibid., 30, p. 562]. The last-mentioned reaction makes testing for stem rust resistance more complicated whenever the Mentana variety is involved.

Darpoux (H.), Faivre-Amiot (A.), & Leblanc (R.). **Essais de lutte contre la carie du Blé par des substances antibiotiques.** [Experiments on the control of Wheat bunt by antibiotic substances.]—*C. R. Acad. Agric. Fr.*, 37, 13, pp. 511–512, 1951.

In comparative experiments at the Central Station for Plant Pathology [Versailles] samples of wheat seed of the variety Renfort infected with spores of *Tilletia tritici* [*T. caries*: *R.A.M.*, 30, p. 263; 31, p. 110] were treated by soaking for (*a*) four hours in the culture liquids of various micro-organisms, (*b*) ten minutes in 1 per cent. copper sulphate, or (*c*) four hours in water, others receiving no treatment. All the soaked lots were partially dried before being sown the next day (9th November, 1950).

The lots treated with the culture liquids of *Aspergillus niger* 1102 and 1104 [see below, p. 244], *Penicillium claviforme* 1044, *P.* sp. 1005, and *Trichothecium roseum* 1.040 (or 1.050) sustained 2, 1, 0, 12, and 24 (0 to 3·7 per cent.) bunted spikes at maturity compared with 0 for copper sulphate and 61·8 per cent. for the lots soaked in water. The liquids of the two *A. niger* strains, however, reduced the germinative

capacity of the seed perceptibly and will have to be tested again after dilution or after a shorter period of soaking.

Démétriadès (S. D.). **Un Hétérosporium sur le Blé en Grèce.** [A *Heterosporium* on Wheat in Greece.]—*Ann. Inst. phytopath. Benaki*, 4, 1–2, pp. 20–26, 1 fig., 1950.

In July, 1947, wheat plants of the Mavragani de Chypre and Dévès varieties from Larissa, Thessaly, bore blackish spots measuring 1 to 5 by 0·5 to 1 mm. on the stems, leaves, and ears. A *Heterosporium* sp. with more or less angular, olivaceous-brown, transversely septate conidiophores, measuring 60 to 138 by 5 to 7·5 μ, was present. The uni- to triseptate, chestnut-brown conidia measured 12·5 to 30 by 7·5 to 14 (mean, 17·5 to 27 by 10 to 12·5) μ. After comparing the fungus with a number of *Heterosporium* species on Gramineae, the author provisionally considers it to be nearest to *H. graminum* Rostr. [cf. *R.A.M.*, 2, p. 391; 3, p. 22; 8, p. 433], not previously recorded from Greece.

McKinney (H. H.) & Sando (W. J.). **Susceptibility and resistance to the Wheat streak-mosaic virus in the genera Triticum, Agropyron, Secale, and certain hybrids.**—*Plant Dis. Reptr*, 35, 11, pp. 476–479, 1951. [Multilithed.]

In greenhouse experiments at Beltsville, Maryland, and at Arlington, Virginia, several species of *Triticum*, *Agropyron*, and *Secale*, and some of their hybrids were inoculated by wiping or spraying with the virus of wheat yellow streak mosaic [a strain of wheat mosaic virus: *R.A.M.*, 31, p. 177]. Mosaic symptoms developed on all the seedlings of 13 out of the 14 species of *Triticum* tested, 7 per cent. of *T. dicoccum* (white emmer) remaining free. A few of the 17 species of *Agropyron* showed local lesions but none developed mosaic; no systemic virus has been detected so far in these species. The commercial rye varieties Balbo, Rosen, South Dakota 44–1, and Star, and *S. montanum* were all highly resistant. Of the 25 hybrid selections showing some resistance 16 carried genes from *A. elongatum*. In two further tests of the eight more resistant selections three developed strong yellow mosaic in all the plants, three showed symptoms of mild mosaic, and two were mosaic-free. Out of 64 selections of wheat hybrids, mainly with *A. elongatum*, only eight were free from mosaic in all the plants. In 20 further selections most plants which failed to be infected by the first inoculation developed symptoms when reinoculated 17 days later, five of the six resistant selections remaining mosaic-free.

Ivanoff (S. S.), Hurt (B. C.), Landrum (R.), Gill (J. B.), Johnson (H. A.), Bowman (D.), & Wedgeworth (S. L.). **Oat varieties compared in Station tests.**—*Miss. Fm Res.*, 12, 8, pp. 1–2, 1 fig., 1949. [Received September, 1951.]

Data obtained from yield tests of oat varieties in six different localities in Mississippi during 1947–8 showed that where leaf rust [*Puccinia coronata*: see above, p. 227] was present in combination with cold injury grain yields, on the whole, were very low [cf. ibid., 30, p. 224]. Similar evidence was obtained in the 1948–9 trials. At present leaf rust, especially race 45 [ibid., 30, pp. 311, 606], seems more important locally than Victoria blight [*Helminthosporium victoriae*: cf. ibid., 31, pp. 52, 113, 180].

Thurston (Joan M.). **A comparison of the growths of wild and of cultivated Oats in manganese-deficient soils.**—*Ann. appl. Biol.*, 38, 1, pp. 289–302, 1 pl., 4 graphs, 1951.

Avena ludoviciana failed to develop the grey speck leaf symptoms of manganese deficiency [*R.A.M.*, 30, pp. 28, 626; 31, p. 188] and differed in this respect from

A. fatua and the cultivated oat varieties Scotch Potato and Star when grown in pots of manganese-deficient soil at Rothamsted Experimental Station, Harpenden, Herts. Otherwise, responses to the level of manganese supply were similar, though the wild species showed less acute necrosis and more marked chlorosis than the cultivated, and also required a smaller amount of manganese for the complete suppression of leaf symptoms. On the basis of percentage loss of total dry weight at harvest due to lack of manganese, *A. fatua* was judged less, and *A. ludoviciana* more susceptible than the two cultivated varieties; no distinction could be made between the latter. Wild oats showed a smaller reduction in the number of seeds formed but a greater reduction in the size and manganese content of individual seeds than the cultivated varieties. Manganese deficiency lowered the percentages of viable seeds and of dormant seeds produced by both wild species.

Stoner (W. N.). **A report on the influence of spray additives on control of Helminthosporium turcicum Pass. in the Everglades.**—*Plant Dis. Reptr*, 35, 11, pp. 487–488, 1951. [Multilithed.]

In 1950–1 further tests were conducted at the Everglades Experiment Station, Florida, to determine the effect of spray additives on the control of leaf blight (*Helminthosporium turcicum*) of sweet corn [*R.A.M.*, 31, p. 13]. The materials tested were p.e.p.s. (polyethylene polysulphide: ½ pt. per 100 gals. spray), triton B 1956 (2 oz.), and Du Pont sticker-spreader (2 oz.). Zineb (2 lb.) was used as the fungicide with all the treatments and alone as a control. Eight weekly applications were made using the Everglades Mule (a high clearance machine) on the susceptible variety Ioana. Spray operations ceased when the tassels appeared, a blanket application of spore suspension having been made ten days earlier. Late spring rains favoured the development of the disease and a uniform infection occurred. The results indicated that under the conditions of this experiment and light disease incidence none of the spray additives appreciably affected control.

Olson (E. O.). **Tip blight of Citrus seedlings in the Lower Rio Grande Valley.**—*Proc. R. Grande Vall. hort. Inst.*, 5, pp. 72–76, 2 figs., 1951.

Every year many citrus seedlings grown for rootstock purposes in the Rio Grande Valley, Texas, die in the seed-bed, most of the loss occurring where heavy rains fall in late May and early June; in other parts losses are negligible. The infected seedlings develop brown, watersoaked areas at the terminal growing-point and on the petioles and leaf blades. The symptoms differ from those of damping-off in that the brown areas do not start at ground level. The disease appears suddenly in individual beds, and in wet weather appears to spread rapidly to previously healthy plants. Later the affected tissues dry up and die. When small plants have succumbed they stand erect and brown with the dead leaves still attached. On many larger seedlings only the lower leaves turn brown, dry, and drop, and these plants often put out new shoots from below the dead terminal shoot. The roots do not appear to become affected until the whole stem is diseased. These symptoms appear to be identical with those of the stem and tip blight of citrus seedlings reported from Israel [*R.A.M.*, 16, p. 451].

Pure cultures of a *Phytophthora* species were repeatedly isolated from diseased material and inoculations of citrus seedlings by spraying them with a water suspension and zoospores of the fungus gave rise to typical symptoms, the fungus being reisolated from the affected plants.

Control measures tentatively recommended include good drainage, avoidance of excess shade, thorough watering at long intervals rather than frequent sprinkling, and spraying the seedlings with Bordeaux mixture every two weeks or drenching the soil with ceresan solution. If the disease appears, watering should be reduced and the plants sprayed with 3–3–100 Bordeaux mixture. Growing seedlings

where others have been raised previously is not advisable. Only seeds from whole, healthy fruit picked from the tree should be used.

Olson (E. O.) & Waibel (C. W.). **Studies on the transmission of Rio Grande gummosis of Grapefruit.**—*Proc. R. Grande Vall. hort. Inst.*, 5, pp. 53-59, 1951.

Studies carried out in Texas on the transmission of Rio Grande citrus gummosis [*R.A.M.*, 30, p. 34] by inoculating apparently healthy grapefruit and Valencia orange trees with chips of wood, gum, and bark from naturally infected trees indicated that grapefruit was susceptible and Valencia orange comparatively resistant. Inoculum placed in deep wounds in the wood reproduced the pink wood symptom [ibid., 24, p. 447] in 90 days, but did not do so when placed between the bark and the wood. In grapefruit the disease spread more rapidly in large branches than in twigs. Inoculations of grapefruit trees in January gave a higher percentage of infections than in March, while few were secured in June. Pruning wounds on the large branches, and broken branches that expose wounds deep in the wood appear to be the usual avenues of infection.

In groves where grapefruit was grown adjacent to Valencia orange trees Rio Grande gummosis often occurred on the former, but the blister and wood stain symptoms were not found on the trunks or branches of the orange trees, though pink wood was sometimes present in gumming orange twigs and small branches. Further work, however, is necessary to ascertain whether staining in orange twigs is related to the disease.

Reuther (W.) & Smith (P. F.). **Tissue analysis as an aid in evaluating the nutritional status of Citrus trees.**—*Proc. R. Grande Vall. hort. Inst.*, 5, pp. 34–45, 1951.

The authors quote data from the literature (17 references) and discuss the value of tissue analysis in evaluating the nutritional status of citrus trees, and the influence of such factors as leaf age, season, rootstock, scion, and fertilizer treatment on leaf composition [cf. *R.A.M.*, 29, p. 24; 30, p. 414]. They suggest that analysis of fibrous roots may also be of value in determining the status of heavy metals and salinity and may supplement leaf analysis data. Notes are given on the collection and preparation of leaf samples.

Zambettakis (C.). **Diplodia natalensis Pole Evans. Stem-end rot des Agrumes.** [*Diplodia natalensis* Pole Evans. Stem-end rot of Citrus.]—*Rev. Mycologie, Suppl. colon.*, 16, 1, Fiche 4, 7 pp., 3 figs., 1951.

In this account of citrus stem-end rot (*Diplodia natalensis*) [*R.A.M.*, 21, p. 486; 22, p. 19; 28, p. 63; *et passim*], its symptoms, cause, and control, the author states that the fungus is readily distinguishable from *Lasiodiplodia* [*Botryodiplodia*] *theobromae* [ibid., 30, p. 181], with which it has sometimes been confused. In *D. natalensis* the pycnidia develop on a subiculum, not in a stroma, and the wall is thicker than in *B. theobromae*; paraphyses are absent, and the spores are paler and have a less distinct ornamentation.

Szkolnik (M.). **Coffee trunk and stem canker in Guatemala.**—*Plant Dis. Reptr*, 35, 11, pp. 500–501, 1951. [Multilithed.]

Canker of coffee trees due to *Ceratostomella* [*Ceratocystis*] *fimbriata* [*R.A.M.*, 30, p. 498] is most prevalent in Guatemala in wet and humid areas. Trunk wounds seem to play a significant part in favouring natural infection. Improved aeration and drainage, reduction of mechanical wounds during weeding, and pruning to prevent the spread of isolated infections to other parts of the tree are all recommended as possible control measures.

Mostafa (M. A.) & Gayed (S. K.). **Effect of Trichoderma metabolites on growth of Cotton plants.**—*Nature, Lond.*, 169, 4296, pp. 359–360, 1 fig., 1952.

In studies on the biological control of cotton wilt (*Fusarium vasinfectum*) [*R.A.M.*, 12, p. 286] at the Fouad I University, Cairo, Egypt, series of pots containing sterilized sandy soil were inoculated with *Trichoderma viride* [ibid., 30, pp. 287, 591; cf. 31, p. 135], incubated at 25° C. for one week, and each sown with six delinted, sterilized Giza 26 cotton seeds. A similar uninoculated series served as a control. *Trichoderma* benefited Giza 26 cotton plants since the number of seedlings was increased and growth was much better in the inoculated soil. The dry weight of cotton seedlings was increased by 47 per cent. when 22 mgm. Baladi (animal) manure was added to the *Trichoderma*-inoculated soil, compared with the uninoculated. Sodium and ammonium nitrates did not give a comparable increase.

In another experiment 30-day-old cut shoots and 10-day-old seedlings of the same cotton variety were grown at about 28° C. in unheated and heated *Trichoderma* and *F. vasinfectum* filtrates, in glucose-peptone liquid, and in water. The metabolites of both *Fusarium* and *Trichoderma* were thermostable and they both stimulated wilting in culture, the process being more rapid in the *Trichoderma* than in the *Fusarium* filtrate in the case of cut shoots, the time taken for complete wilting being 13 and 14 days for unheated and boiled filtrates of the former compared with 21 and 26 for the latter. The longer time (65 days) required to achieve complete wilting in cotton seedlings may be due to the intervention of the roots.

Lachance (R.-O.). **Antagonisme des microorganismes du sol envers le Colletotrichum linicola agent de l'anthracnose du Lin.** [The antagonism of soil micro-organisms to *Colletotrichum linicola*, the agent of Flax anthracnose.]—*Canad. J. Bot.*, 29, 4, pp. 438–449, 1951. [English summary.]

Fifteen [unnamed] organisms isolated from several soils where flax is grown in the Lower St. Lawrence district were antagonistic *in vitro* to *Colletotrichum linicola* [*R.A.M.*, 28, p. 455]. More than half were fungicidal, while the rest exerted a fungistatic action after being in contact with the spores for four days. Bacteria Nos. 363, 365, 420, 421, and 423 induced abnormal spore germination and mycelial growth on solid media, while in liquid culture this was observed only with No. 363. Of twelve media tested potato dextrose agar, Difco nutrient agar, and onion agar were the best for antibiotic production.

Under greenhouse conditions none of the antagonists controlled *C. linicola* on flax seedlings grown from inoculated seed unless the soil was previously sterilized. Under such conditions Nos. 348, 419, 418, 422, 362, and 353 reduced the percentage of anthracnose significantly.

Smith (K. M.). **Some garden plants susceptible to infection with the Cucumber mosaic virus.**—*J.R. hort. Soc.*, 77, 1, pp. 19–21, 3 pl., 1952.

On *Anchusa* the symptoms of cucumber mosaic virus usually consist of ring-like markings with blotches of paler colour. The wild primrose [*Primula vulgaris*: cf. *R.A.M.*, 14, p. 635; 19, p. 61; 31, p. 220] is also attacked, and often becomes infected when grown in gardens; the leaves are distorted and bent over to one side, and the edges tend to curl inwards. Other susceptible ornamentals are begonia [cf. ibid., 16, p. 321], *Campanula*, and *Buddleia* [ibid., 30, p. 40]. *Daphne mezereum* seems to be particularly susceptible; the leaves display conspicuous mottling, usually with a tendency to ring formation, and the flowers are poor or lacking [cf. ibid., 23, p. 438; 29, p. 364].

Phlox virus disease [ibid., 30, p. 40] produces on cucumber a mosaic different from that caused by the true cucumber mosaic virus.

The chrysanthemum mosaic virus [ibid., 29, p. 198], transmitted experimentally, produces a severe disease on nasturtium (*Tropaeolum*), and can also infect *Phlox drummondii*, *Zinnia*, *Helichrysum*, wallflower, *Primula sinensis* var. *stellata*, lettuce, and soy-bean.

Baker (K. F.) & Davis (Lily H.). **Some diseases of ornamental plants in California caused by species of Alternaria and Stemphylium.**—*Plant Dis. Reptr*, 34, 12, pp. 403–413, 1950. [Multilithed.]

Of the diseases observed on flowers in California during the past decade *Alternaria* leaf and stem spot on *Calendula officinalis* appears to be the first record of the disease in North America. Although the fungus agreed morphologically with *A. porri* [*R.A.M.*, 28, p. 160; 31, p. 173] as defined by Neergaard [ibid., 25, p. 581] and resembled *A. porri* from *Gerbera* in California, the *Calendula* isolate was not chromogenic as was that reported by Neergaard on *Gerbera*. Inoculation tests succeeded on only six out of 26 *Calendula* plants, killing one and severely attacking three others. Parallel tests with *A. porri* from leek and *A. porri* f. *solani* [*A. solani*: loc. cit.] from tomato were negative on *Calendula*. In further inoculation tests the *Calendula* fungus was strongly pathogenic to lettuce and slightly so to *Godetia*. *A. porri* was also present on *Gerbera jamesoni* [cf. ibid., 18, p. 114] from various sources. Although observational evidence indicates that the fungus is seed-borne on *Gerbera* in California, this has not been definitely established. A Bordeaux spray gave fairly effective control on mature plants in the field in coastal areas.

Seed flats of Chabaud's Yellow carnations were attacked by *A. dianthicola* [ibid., 30, pp. 140, 309]; this is believed to be the first record of both pathogen and disease in the United States [cf. ibid., 29, p. 499]. Neighbouring flats of Early Dwarf Vienna Mixed and J. M. Bridgeford had only slight infections. The evidence that the fungus was seed-borne in Chabaud's Yellow was verified by sowing some of the seed in pasteurized soil at Los Angeles.

A *Stemphylium* leaf spot of gladiolus produced in culture a perfect state resembling *Pleospora herbarum*. The disease is known in Michigan, California, Florida [ibid., 27, p. 566], New York, and New Jersey. It was observed in Florida apparently as early as 1940. Infection may occur after only ten hours' continuous moisture.

The occurrence of *A. brassicae* in a commercial seed field of honesty (*Lunaria annua*) appears to constitute a new host record. *A. saponariae* (= *A. dianthi*) severely damaged a small seed planting of *Saponaria vaccaria* [ibid., 25, p. 580] and *A. senecionis* attacked cineraria [ibid., 29, p. 415] in greenhouses.

Apparently the first collection of *A. zinniae* [ibid., 22, p. 389] in California was made in August, 1941, in a commercial seed field of *Zinnia elegans* at Lompoc. The disease was probably present and the fungus disseminated on Californian seeds for some years before its discovery. As the result of several tests and the treatment of several hundred pounds of *Zinnia* seed, the use of hot water at 125° F. for 30 minutes has been adopted as a standard method of control. This treatment does not seriously impair the germination of new seed but may injure that over two years old. It is suggested primarily for seed intended for commercial seed production. Indexing in the greenhouse in flats of moist pasteurized soil indicated the high prevalence of *A. zinniae* in seed from coastal and inner-coastal areas of California, whereas that from the dry interior valleys may be free from contamination.

Blumer (S.). **Das epidemische Auftreten eines Oidiums auf Syringa vulgaris.** [The epidemic occurrence of an *Oidium* on *Syringa vulgaris*.]—*Phytopath. Z.*, 17, 4, pp. 478–488, 1 fig., 1 map, 1951. [English summary.]

A powdery mildew of lilac [cf. *R.A.M.*, 26, p. 154] is stated to be traversing Switzerland from west to east in epiphytotic form. Its diffusion was most extensive from 1948 to 1950. According to W. C. Moore (*in litt.*), the disease is also present

in England and Wales, having been first observed by F. T. Brooks in Surrey in 1948, and its detection in Spain in 1950 was reported by de Urries to E. Mayor. Infection was probably introduced on a consignment of plants from the United States and its spread to other European countries is to be anticipated. The causal organism cannot be definitely identified in the absence of perithecia, and it is accordingly proposed to name it *Oidium syringae* auct. In size and shape the conidia of the European material agree closely with those of *Microsphaera syringae* or *M. alni* [ibid., 28, p. 594].

Baillie (A. F. H.) & Jepson (W. F.). **Bud blast disease of the Rhododendron in its relation to the leaf-hopper Graphocephala coccinea Forst.**—*J. R. hort. Soc.*, 76, 10, pp. 355–365, 1 pl., 1 fig., 1 graph, 1951.

Bud blast of *Rhododendron* caused by *Pycnosteanus* [*Pycnostysanus*] *azaleae* [*R.A.M.*, 30, p. 162] is particularly prevalent and severe in the sandy areas of Ascot [Berkshire], Bagshot, and Woking [Surrey], and is associated with a recent increase in the population of the leafhopper *Graphocephala coccinea* [loc. cit.]. The disease was studied on properties in these localities. Incidence was assessed by the following arbitrary grades used in conjunction with egg counts: 0, no apparent signs of blast; 1, patches of dead brown scale tissue covering less than one half of the bud (frequently coinciding with egg distribution); 2, dead brown patches covering more than half of the bud and disease extending to the heart; 3, bud brown throughout, a few coremia visible; and 4, quite dry and covered with black coremia. Grade 4 is usually characteristic of buds infected in previous years but may develop within three months of the first infection. In grade 4 there may be 100 per cent. mortality of leafhopper eggs on buds which develop blast during the winter, while in grade 1 it is negligible. Grade 4 buds commonly remain on the plant for two or three years; up to six generations of affected buds have been recorded on the same branch. Infection rarely extends to the wood below the bud, and then only for ½ to 1 in.

At Ascot healthy bushes of the variety Polar Bear grew among heavily infected varieties. In general, hybrids appear more susceptible than species although some, such as *R. souliei*, are often badly affected. *R. diaprepes*, *R. auriculatum*, *R. artosquameum*, *R. griersonianum*, Argosy, and Polar Bear were completely free from blast during the winter of 1949 to 1950 and also had no leafhopper eggs. Queen Souriya and *R. oreodoxa* were free from blast but infected with eggs. *R. falconeri* and *R. fictolacteum* were free from both eggs and blast at Titness Park; *R. discolor* also appeared blast-free but its egg population was not determined. A record of egg counts and blast incidence on the Ascot property during 1950 suggests that the disease may be directly associated with the leafhopper or else there is some factor in the bud which favours the disease and insect independently. The first hypothesis appears the more reasonable. Surveys of blast incidence at Wentworth in April and May, 1951, generally confirmed the results of the Ascot survey.

During 1950 single plants of the varieties Marchioness of Lansdowne, Doncaster, Bagshot Ruby, and C. B. Van Nes at Wentworth were sprayed fortnightly with a proprietary Bordeaux mixture from 15th June to 15th October. They all bore a good flower crop for the first time for several years. One plant of Bagshot Ruby in a row of six had 10 per cent. blasted buds against 75 per cent. for unsprayed plants. Some sensitive hybrids, however, may develop brown spotting and leaf drop several months after spraying. A mercury fungicide is to be tested in 1951 and a trial of combined insecticide and fungicide is suggested.

Weimer (J. L.). **Two virus diseases of Blue Lupine.**—*Plant Dis. Reptr*, 34, 12, pp. 376–378, 2 figs., 1950. [Multilithed.]

During spring, 1949, two virus diseases were present in Georgia in epiphytotic

form on blue lupin (*Lupinus angustifolius*), one at the Coastal Plain Experiment Station, Tifton, and the other on a farm at Oglethorpe. In some areas up to 100 per cent. of the plants were diseased and many were killed. Traces only were present in 1950. Symptoms of both were dwarfing, malformation, and finally death. The Tifton disease was characterized also by downward curling of the leaflets, especially in the upper part of the plant. The leaflets were a half to two-thirds the width of healthy ones and the entire foliage was yellowish-green in colour. Numerous leaves developed from axillary buds and branches. At Oglethorpe the affected leaflets were somewhat dwarfed but wider and thicker than those at Tifton, were rigid, and pointed upwards. The lower surface was often somewhat purplish. In both areas the leaflets became smaller as the plant died. The xylem, pith, and cortex of the stems and roots of plants in an advanced stage of either disease became brownish and finally decayed. Discoloration spread throughout the root system and up the stem. The few seeds produced were small and shrivelled.

The Tifton disease was transmitted several times by sap and [unspecified] aphids from blue lupin to this host, chilli (*Capsicum annuum*), and cucumber. Field evidence indicated that it was caused by pea mosaic or some other pea virus since it appeared in severe form in 1949 only in plots near Dixie Wonder field peas and failed to reappear in 1950 when they were omitted from the rotation. The symptoms, however, were not like those described in the literature for pea mosaic virus on lupin [*R.A.M.*, 23, p. 301] or any other virus disease of blue lupin [ibid., 25, p. 68]. All attempts to transmit the Oglethorpe disease were negative. Neither disease appears to be seed-borne.

Loveless (A. R.). **Observations on the biology of Clover rot.**—*Ann. appl. Biol.*, 38, 3, pp. 642–664, 1 pl., 1 graph, 1 diag., 1951.

The field behaviour of clover rot (*Sclerotinia trifoliorum*) [*R.A.M.*, 27, p. 283; 29, p. 621; 31, p. 187] in eastern England indicates that infection is caused by ascospores liberated in October and November and not by soil-borne mycelium developing directly from the sclerotia. Red clover, generally sown in spring, never contracts the disease until late autumn or the following spring, even on land known to be contaminated with sclerotia and when climatic conditions during the highly susceptible seedling stage are favourable for the establishment of the rot. Incidence depends on the weather, and in some years the disease may be very slight, whereas infection by a soil-borne organism might be expected to recur to an appreciable extent every year. Field peas (*Pisum arvense*) succumb as readily as red clover to inoculation with *S. trifoliorum* and its var. *fabae* [loc. cit.], yet they are used for filling in [broad] bean crops thinned by bean rot and have never been observed in England to be affected with the disease, the success of the practice being explained by the fact that they are generally sown in March, when ascospores are not being produced. In an experiment in 1946–7 to test the effect of cutting red clover during ascospore discharge on the subsequent development of the disease, cutting in mid-September resulted in a disease reduction in the following spring from 12·2 to 1·4 per cent.

Ascospore infection of clover produced a 'non-aggressive', inconspicuous spotting, the fungus remaining viable in the spots for at least 16 weeks. Similar initial symptoms occurred when broad beans were infected with *S. trifoliorum* var. *fabae*. 'Aggressive' infection on bean leaflets developed from the first phase only in a saturated atmosphere, within a temperature range of 5° to 20° C., and its establishment was favoured by a heavy initial dosage of inoculum. In most seasons humidity is the chief limiting factor in the field; over the period 1930–47 there is a significant regression between the severity of clover rot in East Anglia and the previous December plus January rainfall.

Experience shows that crop rotation is only a palliative, and its effect may be

nullified if fields in the vicinity are heavily infected. Autumn grazing of clover needs to be practised with circumspection as its results may be worse than those of the disease. Effective control depends mainly on the production of resistant strains.

Fernando Mujica (R.). **Medidas adicionales de control de la esclerotiniosis del Girasol.** [Supplementary measures for the control of Sunflower sclerotiniosis.] —*Agric. téc., Chile*, 10, 2, pp. 74–78, 1950. [English summary.]

The wilt caused by *Sclerotinia sclerotiorum* is the principal, if not the only disease of sunflowers in Chile, where the crop, covering an area of 49,759 ha., is the main source of oil, with an annual yield of approximately 23,299,793 l., the estimated reduction by the fungus being 5 per cent. The increasing prevalence of the wilt is attributed to the use of seed contaminated by mycelium and sclerotia. Measures recommended for the control of the disease [cf. *R.A.M.*, 8, p. 246] comprise the use of certified seed; a minimum of four years' rotation with cereals or grasses; eradication and burning of all infected plants and residues; suspension of irrigation from contaminated areas; thorough cleansing of implements used in such soils; the widest economically practicable spacing between the plants; elimination of weeds; and very sparing watering. Seed of uncertain origin should be cleaned and disinfected; for this purpose ceresan and meracet appeared to be the most effective of the fungicides tested, giving absolute control at dosages of 1 in 500.

Proceedings of the sixty-third convention of the American Pomological Society in joint session with Washington State Horticultural Association.—218 pp., 5 graphs, 1949.

At this meeting, held at Yakima, Washington, 6th–8th December, 1948, the following were reported (pp. 29–44). J. R. Kienholz in a paper on 'The evaluation of mildew sprays at Hood River' states that Anjou pear yields at Hood River, Oregon, have increased by over 50 per cent. since 1943 when fermate was replaced by wettable sulphur for the control of mildew [*Podosphaera leucotricha*: C.M.I. map No. 118; *R.A.M.*, 9, p. 537]. Years of experience have demonstrated the need for using lime-sulphur consistently as a delayed dormant spray on Anjou pears, otherwise russetting will occur. Kolofog [ibid., 28, p. 525] was the only sulphur fungicide tested that did not noticeably reduce Anjou pear yields or cause russetting when used in the cover sprays. Applied in the pink and calyx stages it controlled mildew adequately at the rate of 4 to 6 lb. in 100 gals. water. A combination of 4 lb. kolofog with $\frac{3}{4}$ or 1 lb. fermate or zerlate is recommended for controlling both mildew and scab [*Venturia pirina*].

According to W. A. Luce pear blight [*Erwinia amylovora*: ibid., 29, pp. 264, 367] became more serious in Yakima County and all north-central Washington from 1945 to 1948 owing to the increase in perennating cankers and favourable weather conditions. The spray schedule recommended by W. P. Tufts and J. E. De Tar for the control of pear blight epidemics in California includes the treatment of cut shoots and spurs and the surrounding area of bark with zinc chloride. The concentrations suggested for trunks and branches with scaly bark are: trees over 15 years old, 53 per cent.; 10 to 15 years, 43 per cent.; 8 to 10 years, 33 per cent.; and under 8 years, 23 per cent. Trees with smooth bark take the next lower concentration. The apparently healthy shoots which appear from the trunks and crowns during spring should be removed, all tools and wounds being disinfected.

Most of the work on control of apple mildew [*P. leucotricha*: see next abstract] has been noticed from another source [ibid., 30, p. 475].

A. Van Doren (p. 162) in a paper on 'Air purification in apple and pear storage' reports that ordinary storage scald [ibid., 29, p. 33] on apples and Anjou pears can be reduced in severity by this method to about the level effected with

oiled paper wraps. With Bartlett, Comice, and Bosc pears, however, scald can be avoided only by storage at 29° to 31° F. If over-mature these varieties are almost sure to scald.

Experiments on decay resulting from apple handling were carried out during 1947 and 1948 by E. Smith, T. R. Wright, and D. Adams (pp. 178–183) with special reference to the importance of blue mould 'lenticel decay' (*Penicillium expansum*) [ibid., 26, p. 456; 28, p. 221] in Delicious, Starking, and Richared apples of various sizes. They were picked bruise-free, then uniformly bruised and dipped in a suspension of blue mould spores, and stored at 31° until December. No infection occurred on fruit neither bruised nor inoculated, and very little on that bruised only. With fruit both bruised and exposed to spores up to 44 per cent. of the bruises developed decay, which was of the typical lenticel type. The greatest number of infections occurred on large fruits with severe bruises. The Richared apples, picked at a very advanced stage of maturity, developed the greatest number of infections and Delicious, picked at the earliest stage, the least.

Studies by E. L. Reeves and E. C. Blodgett on 'Diseases and disease control in orchards irrigated by sprinkling' indicated that apple powdery mildew, pear blight and downy mildew (*Phytophthora cactorum*) [ibid., 21, p. 531; 26, p. 157], and *Coryneum* blight of apricots [*Clasterosporium carpophilum*: ibid., 22, p. 440] were aggravated by this practice, particularly where there was a relatively heavy cover crop and part of the foliage or trunk was wetted.

C. F. Kinman reports (p. 190) that the nectarine varieties Nectacrest, Nectalate, Nectaheart, and Nectarose, developed at the New Jersey Agricultural Experiment Station, New Brunswick, are less susceptible to brown rot [*Sclerotinia fructicola*: ibid., 27, p. 139] than Garden State, and Stoner peach possesses considerable resistance.

Marc (B.). **L'oïdium du Pommier.** [Oidium of Apple.]—*Courr. hort.*, 12, 10, pp. 540–543, 1950. [Received March, 1952.]

In orchards in sunny situations facing south, on deep, warm, sandy soil, and exposed before flowering to easterly winds, apple powdery mildew [*Podosphaera leucotricha*: cf. *R.A.M.*, 30, pp. 177, 276 and preceding abstract] occurs very early and in a severe form [in Belgium]. Wet, cold situations and damp or rainy conditions in spring do not favour infection. The Belle de Nordhausen, Reinette de Landsberg, and Jonathan varieties grafted on East Malling type I stock were more susceptible than on other stocks. Type XVI gives much more resistant trees. The control measures recommended consist in the careful cutting away of diseased parts, a winter application of carbolineum, and spraying twice before and three times or more after flowering, using 2·5 kg. lime-sulphur plus 500 gm. micronized copper oxychloride and 100 gm. sticker per 100 l. water for the first application, 1 kg. lime-sulphur, 300 gm. wettable sulphur, and 100 gm. sticker for the second (pink bud stage), 750–300–100 at petal-fall, and 500 gm. wettable sulphur plus 100 gm. sticker 20 days later and subsequently. As a combination spray, a mixture of 500 gm. super-arsenate of lead, 300 gm. wettable sulphur, and 100 gm. sticker is recommended.

Lamb (J. G. D.). **The Apple in Ireland ; its history and varieties.**—*Econ. Proc. R. Dublin Soc.*, 4, 1, pp. 1–63, 13 pl., 3 figs., 1951.

In this popular account of apple-growing in Ireland, it is stated that during a survey of local varieties many were found to be free from scab [*Venturia inaequalis*: *R.A.M.*, 28, p. 129] even in the summer of 1948 when the disease was generally prevalent. It is probable that any very susceptible varieties would long ago have been discarded, as most date from the time before anti-scab sprays came into use.

The variety Ballyfatten, reported to be intolerant of sprays after flowering,

developed no fruit scab and only a few doubtful spots on the leaves in one locality; no canker [*Nectria galligena*: ibid., 27, p. 75] was present. No scab or canker was seen on Clearheart, Dunkitt, Greasy Pippin, Keegan's Crab, Scarlet Crofton, Striped Brandy, or Yellow Pitcher. Green Chisel bore no scab, and only slight canker on one tree. Kill Apple (or Eight Square), Red Brandy, Reid's Seedling, Striped Sax, Summer John (reported not to tolerate lime-sulphur or Bordeaux after flowering), Sweet William, and White Crofton had no scab. Only slight scab was seen on fruits of Honey Ball, on a few fruits of Lady's Finger, and occasionally on Kerry Pippin.

Darpoux (H.) & Faivre-Amiot (A.). **Action curative de quelques substances antibiotiques et d'un produit organo-mercurique sur la tavelure du Pommier.** [The curative effect of some antibiotic substances and an organo-mercurial product on Apple scab.]—*C. R. Acad. Agric. Fr.*, 37, 3, pp. 136–139, 1951.

Experiments were carried out at the Central Station for Plant Pathology, National Institute of Agronomic Research [Versailles], to test the curative effect of various fungicidal solutions and crude culture liquids of various micro-organisms [see above, p. 234] sprayed on to East Malling III apple seedling stocks infected with scab [*Venturia inaequalis*: *R.A.M.*, 29, p. 157; 31, pp. 189, 197]. The treatments were applied on 5th June several days after primary infection had taken place, spots appeared from 13th to 19th June, and the results were assessed on the 24th. The number of lesions in each treatment was expressed as a percentage of the untreated control as follows: *Aspergillus niger* ML.1.102 (18 per cent.), *Penicillium claviforme* ML.1.044 (21), phenylmercurytriethanol ammonium lactate (27), *A. niger* ML.1.107 (35), *Sclerotium bataticola* [*Macrophomina phaseoli*] ML.1.224 (41), *P. patulum* ML.1.041 (51), *Aspergillus* sp. ML.1.225 (54), and *Trichothecium roseum* ML.1.050 (60). For the first three the reduction was significant.

In the second experiment using the materials which had given the best results the new shoots were sprayed on 31st July after the branches had been cut back. Scab spots appeared on 15th August and were counted on the 17th. The results were similar to those in the first experiment; the liquid from *A. niger* ML.1.107 reduced the lesions to 21 per cent. of the control, followed by phenylmercury-triethanol ammonium lactate (28), *P. claviforme* ML.1.044 (37), and *T. roseum* ML.1.050 ML.1.050 (61).

Ramsfjell (T.). **Soppsjukdomar på Eplefrukt.** [Fungal diseases of Apple fruit.]—*Frukt og Bær*, [4], pp. 79–94, 15 figs., 1951.

The writer records observations on 19 fungi isolated from stored apple fruits in Norway, including the following: *Mucor hiemalis* [cf. *R.A.M.*, 26, p. 270] and *M. piriformis* [cf. ibid., 21, p. 531], both of frequent occurrence; *Penicillium expansum* [ibid., 27, pp. 368, 369 and above, p. 243]; *Botrytis cinerea* [ibid., 29, p. 217], the most prevalent species; *Phytophthora cactorum* [ibid., 29, p. 263]; *Monilinia* [*Sclerotinia*] *fructigena* [C.M.I. map No. 22], commonly present; *Glomerella cingulata* [*R.A.M.*, 29, p. 219]; *Gloeosporium album* [ibid., 26, p. 17]; *Fusarium avenaceum* [cf. ibid., 29, p. 607]; *Phacidiella discolor* [ibid., 25, p. 185]; *Phoma* sp.; *Corticium bisporum*, agreeing in all respects with *C. centrifugum* [cf. ibid., 26, p. 415]; *Stemphylium consortiale* [ibid., 24, p. 42]; *Gymnosporangium tremelloides* [ibid., 30, p. 166]; and *Leptothyrium pomi* [ibid., 19, p. 291].

Sprague (R.) & Hord (H. H. V.). **The reappearance of silver leaf in the Apple orchards of Washington State.**—*Plant Dis. Reptr.*, 34, 12, p. 414, 1950. [Multilithed.]

Severe symptoms of silver leaf (*Stereum purpureum*) [*R.A.M.*, 30, p. 362] were observed on the apple varieties Red and Golden Delicious, Jonathan, and Rome

Beauty in the Entiat, Methow, Okanagan, and Yakima Valleys of Washington for the first time for several years [ibid., 4, p. 15; C.M.I. map No. 30] in localized areas where the trees had suffered considerable damage from the severe winters of 1948–9 and 1949–50.

Diehl (W. W.). **A Microstroma on Peach.**—*Plant Dis. Reptr*, 35, 11, p. 497, 1 fig., 1951. [Multilithed.]

In August, 1951, a *Microstroma* sp. was recorded for the first time on peach on necrotic areas of the leaves at the South Carolina Sandhill Experiment Station, near Columbia. Though agreeing closely with descriptions of *M. tonellianum* on plums in Italy [*R.A.M.*, 10, p. 678], further studies will be necessary to determine its identity.

Blumer (S.). **Über das Bandmosaik an Zwetschgenbäumen.** [On the band mosaic of Damson trees.]—*Schweiz. Z. Obst- u. Weinb.*, 60, 23, pp. 451–454, 1 fig., 1951.

Attention is drawn to the occurrence on damsons in Switzerland of band mosaic [cf. *R.A.M.*, 27, p. 27]. The symptoms have hitherto been confined to the foliage and the trees appear to sustain no damage from the infection. Ersinger Früh is the variety most commonly affected, but Bühler Früh, Zimmers Früh, Agener Kaiser, Fellenberg [cf. above, p. 224], and other varieties in the vicinity of Basel have been observed to harbour the virus. A disease causing irregular depressions on the fruits, associated by Atanasoff in Bulgaria with the line-pattern virus [ibid., 14, p. 367], appears to have no connexion in Switzerland with the above-mentioned foliar symptoms.

Stoll (K.). **Ist eine Desinfektion von viruskranken Pfropfreisern möglich?** [Is a disinfection of virus-diseased graft scions possible?]—*Schweiz. Z. Obst- u. Weinb.*, 60, 21, pp. 418–419, 1 fig., 1951.

Experiments at the Wädenswil Research Station, Zürich, Switzerland, in the control of the Pfeffinger virus of cherries [see above, p. 224] by immersion of the graft scions in (1) water heated to 48° C. for ten minutes, (2) a 0·1 per cent. solution of oxyquinoline benzoate, and (3) solutions of substance 'A' were unsuccessful.

Klesser (P. J.). **A virus disease of Red Currant (Ribes rubrum L.).**—*Ann. appl. Biol.*, 38, 3, pp. 707–713, 1 pl., 1951.

Studies were carried out at the Plant Virus Research Unit, Molteno Institute, University of Cambridge, on a new virus disease found on two sets of red currant plants imported from Holland into England in 1948. The plants had malformed, dark green leaves with vivid yellow rings. The virus was inactivated at 66° to 68° C., tolerated a dilution of 1:2,000 but not 1:5,000, lost infectivity after seven to nine days *in vitro*, and was transmitted by sap inoculation only. It also infected tobacco, *Nicotiana glutinosa*, *N. rustica*, *N. glauca*, *N. sylvestris*, *Petunia hybrida*, cucumber, *Amaranthus tricolor*, *Datura stramonium*, *Nicandra physaloides*, *Physalis angulata*, *Solanum mericatum*, *S. nigrum*, *S. nodiflorum*, spinach, *Tetragonia expansa*, and *Zinnia elegans*. Red currant seedlings inoculated from tobacco developed symptoms in about 28 days. Young leaves displayed chlorotic rings about 1 cm. in diameter with green centres, or irregular bands roughly following the veins, with slight malformation. The lower leaves showed occasional chlorotic flecks along the veins, or small rings. As the leaves matured this chlorosis became vivid yellow, but no symptoms appeared in the new growth. In late summer the only symptom was vein chlorosis on the 5th to 10th leaves. No symptoms developed on greenhouse cuttings or on young plants inoculated out of doors.

On White Burley tobacco local necrotic ring spots appeared in six to eight days, followed by systemic, concentric, chlorotic patterns after 16 to 20 days. Infection

failed to protect the plants against tobacco ring spot virus [*R.A.M.*, 28, p. 492]. The host range and physical properties of the red currant virus differ from those of other ring spot viruses, and the name red currant ring spot virus is suggested.

Rose (F. J.). **Soft fruits.**—*J. R. hort. Soc.*, 77, 1, pp. 12–19, 1952.

Of the new strawberry varieties raised in recent years by Mr. D. Boyes of the Cambridge Horticultural Research Station, No. 456, after seven years' trial, has proved very resistant to mildew [*Sphaerotheca humuli*: *R.A.M.*, 18, pp. 325, 654; 24, p. 156; 27, pp. 28, 373]. The worst gooseberry disease in England is the American gooseberry mildew [*S. mors-uvae*: ibid., 30, pp. 478, 619; 31, p. 24], the prevalence of which is increasing.

Prentice (I. W.) & Woollcombe (Tamsyn M.). **Resolution of Strawberry virus complexes. IV. The latent period of virus 3 in the vector.**—*Ann. appl. Biol.*, 38, 2, pp. 389–394, 1951.

Further work on the resolution of strawberry virus complexes [*R.A.M.*, 28, p. 341] demonstrated that from the time that *Capitophorus fragariae* [ibid., 31, p. 131] was first fed on plants infected with virus 3 [ibid., 31, p. 171] ten to 19 days elapsed before the insect became infective. This latent period decreased with increasing duration of the infection feed. Aphids which had fed for 16 days on an infected plant caused infection during the first day of test feeding.

Castellani (E.). **Notizie sul 'deperimento progressivo dell' Olivo' e sulla sua presenza nell' America meridionale.** [Notes on 'progressive decline of Olives' and its presence in South America.]—*Riv. Agric. subtrop. trop.*, 45, 7–9, pp. 236–238, 1951.

The author reviews the symptoms of progressive decline or leptonecrosis of olive trees already described from Italy [*R.A.M.*, 18, p. 537; 28, p. 227 and next abstracts]. Up to the present it has been reported from Lazio [loc. cit.], Umbria, Calabria, Toscana, Liguria, Sardinia, and possibly Portugal. A similar disease occurs in Spain [ibid., 25, p. 172] and in Argentina where it is termed 'partial paralysis' [ibid., 30, p. 377]. During a recent visit to the Domingos Petrolini Horticultural Experiment Station, Rio Grande do Sul, Brazil, the author observed typical symptoms of progressive decline on young Italian olive plants. The symptoms were not severe, however. The disease was probably introduced into South America from Europe with infected propagating material.

Scaramuzzi (G.). **La leptonecrosi dell' Olivo nella zona di Albenga.** [Olive leptonecrosis in the Albenga region.]—Reprinted from *Olearia, 1951*, 7–8, 9 pp., 8 figs., 1 map, 1951. [French, English, and German summaries.]

Details are given of the symptoms, histology, and etiology of 'leptonecrosis' of olive trees [see preceding and next abstracts] which has been observed on the Merlina, Taggiasca, and Colombara varieties in the Ceriale and Albenga districts of Liguria [loc. cit.], Italy, for about fifteen years. It is believed that the disease may be of virus origin.

Baldacci (E.) & Fogliani (G.). **Un' alterazione da eziologia incerta negli Olivi del Garda.** [A decline of uncertain etiology affecting Olive trees in the Garda area.]—Reprinted from *Olearia, 1951*, 9–10, 6 pp., 3 figs., 1951. [French, English, and German summaries.]

The symptoms are given of a leptonecrosis of unknown origin affecting olive trees [see preceding abstracts] of all ages, particularly those from three to 15 years

old, in the districts adjoining Lake Garda, north Italy. Young trees die within 2 or 3 years. The varieties Gargnà, Casaliva, Frantoio, Moraiolo, and Leccino are all affected although the last-named appears more resistant than the others. The disease was more evident on clay than on gravelly soil. The distribution of associated insects is given.

Ramsey (G. B.) & Smith (M. A.). **Ceratostomella paradoxa Dade on Banana.**—*Plant Dis. Reptr*, 34, 12, pp. 396–397, 1 fig., 1950. [Multilithed.]

Perithecia of *Ceratostomella paradoxa* were observed at Chicago in January, 1950, on the stalks of bananas [*R.A.M.*, 27, p. 100] from Central America. This is believed to be the first occurrence of the perfect state on this host.

Un pal injecteur mécanisé pour l'agriculture et l'horticulture. [A mechanized stake-injector for agriculture and horticulture.]—*Courr. hort.*, 12, 10, pp. 538–539, 2 figs., 1950. [Received March, 1952.]

A description is given of a mechanized injector for introducing disinfectants, etc., into the soil without turning the soil over, and reaching root level without injuring the roots, invented by M. F. J. Assoignons of Les Ateliers de Constructions F. J. A. Multipal, Avesnes sur Helpe, France. A distributing wheel turning at a speed depending on the rate of advance of the machine carries eight hollow stakes. The rotary movement of the wheels causes the stakes to penetrate the ground successively, and as they do so they discharge under pressure a predetermined quantity of liquid carried from a tank to the pumps, which are brought into action by the distributing wheel or wheels. The distance between the stakes can be regulated, and they penetrate to a depth of 24·5 cm. The pumps deliver 40, 65, or 95 ml. of fluid per injection, which per wheel per km. is equivalent to 135, 220, and 320 ml., respectively. The complete distributing wheel weighs (when detached) 380 kg. The apparatus can be either tractor- or horse-drawn and travels at 2 to 4 km. per hr. (optimum 3 km. per hr., equivalent to 19,000 injections). Performance was satisfactory.

Cunningham (G. H.). **Control of plant pests and diseases. List of fungicides and insecticides tested by Plant Diseases Division.**—*N.Z. Gdnr*, 8, 4, pp. 267–272, 300, 1951.

The New Zealand Plant Diseases Division has introduced the certification of therapeutants [*R.A.M.*, 18, p. 235]. The manufacturer or his agent offers the Division samples and particulars of the product, which is then tested in the laboratory and field under rigorously controlled conditions. If the therapeutant passes the tests it is certified and the product listed in the Certification Lists, published in January and July every year.

The 29th List, July, 1951, cancelling all previous lists, gives the trade name, manufacturer or agent, purpose, and recommended dosage or concentration of a large number of preparations, including the colloidal sulphurs, colsul 25 and colsul 40, for the control of black spot [scab] and powdery mildew [? of apple: *Venturia inaequalis* and *Podosphaera leucotricha*: cf. ibid., 21, p. 294; 30, p. 362]; copper compounds, cuprokylt [cf. ibid., 31, p. 81] for the control of blight of tomatoes and potatoes [*Phytophthora infestans*: ibid., 30, p. 362], *Septoria* spot of celery [*S. apii*: ibid., 27, p. 116], and lettuce ring spot [*Marssonina panattoniana*: ibid., 23, pp. 323, 474], cuprox [ibid., 29, p. 345; 30, p. 362, *et passim*] for the control of tomato late blight, oxicop [ibid., 28, p. 512, *et passim*], and perenox [ibid., 30, pp. 588, 589, 631, *et passim*]; and fernasan [ibid., 30, p. 491] for the control of pre-emergence damping-off of peas [cf. ibid., 29, p. 110; 30, p. 134].

YARWOOD (C. E.). **Fungicides for powdery mildews.**—Reprinted from *Proc. 11th int. Congr. Crop Prot.*, 22 pp., 11 graphs, 1 fig., [? 1951.]

Tests (mainly in the greenhouse) were conducted at the University of California, Berkeley, to ascertain the toxicity of various fungicides to the powdery mildew *Erysiphe polygoni* on Pinto bean [*Phaseolus vulgaris*] and red clover [cf. *R.A.M.*, 21, p. 382; 25, p. 225], and to a limited extent to *E. cichoracearum* on cucumber, cantaloupe, *Calendula*, and chrysanthemum, *E. graminis* on barley, *Sphaerotheca pannosa* on rose [ibid., 31, p. 129] and peach, *S. humuli* on strawberry, *Uncinula necator* on vine, and *Podosphaera leucotricha* on apple [see above, p. 243]. It was found that the response of *E. polygoni* on bean in the greenhouse to protective or therapy applications of fungicides followed a straight line relation when the probits of disease control were plotted against the logarithm of the dosage, and the slopes of the dosage response curves varied from 0·75 to 6. Immersion of spores or infected leaves in water was more injurious to the fungus than to the host, and therapy applications of fungicides were lethal to the fungus at lower dosages when the plants were kept wet after spraying than when dried off immediately. The larger the amount of inoculum in trials of protective sprays, and the greater the infection in those of therapy sprays, the greater the dosage of fungicide required for control and the flatter the slopes of the dosage response curves. With lime-sulphur the dosage for 95 per cent. control ranged from about 1·5 per cent. for a protective spray applied six days before inoculation to 0·003 per cent. for an eradicant spray applied immediately after inoculation and to 0·15 per cent. for a therapeutic spray applied five to ten days after inoculation.

The most effective or most promising sprays tested were lime-sulphur, wettable sulphur, copper acetate, malachite green, dicyclohexylamine salt of 2–4–dinitro–6–cyclohexyl phenol, tetrachloronaphthoquinone, actidione [ibid., 31, p. 129], and dinitro capryl phenyl crotonate [cf. ibid., 30, p. 475]. For sulphur-tolerant crops no better material than lime-sulphur was found, and for sulphur-sensitive hosts the most promising was the crotonate. The addition of a spreader enhanced the effectiveness of all chemicals tested as therapeutants, but in protective applications it increased that of some and decreased that of others. Mixtures of lime-sulphur and ferrous sulphate were more fungicidal than the combined effect when each was applied separately. The volatile fungicidal action of dried sulphur deposits increased with increasing sulphur dosage, but decreased with increasing air movement and increasing age of infection. Of other volatile materials tested the most active was diphenyl. Magnesium thiosulphate conferred immunity when taken up in the transpiration stream through cut stems, but was less effective when added to soils or nutrient solutions in which plants were growing. Bean mildew was killed without apparent host injury when infected leaves were immersed in water at 35° to 55° C. Differences between *E. polygoni* and *E. cichoracearum* in response to fungicides were observed, but it is believed that most powdery mildews respond similarly.

KOCH (L. W.). **Methyl bromide as a soil fumigant for disease, insect, and weed control in Tobacco and vegetable seed beds.**—*Down to Earth*, 7, 2, pp. [2–3, unnumbered], 6 figs., 1951.

In recent tests at the Laboratory of Plant Pathology, Harrow, Ontario, piles of commercial muck soil on tobacco farms in four different areas of the Ontario Burley tobacco region were treated according to [manufacturer's] recommendations with dowfume MC-2 (98 per cent. methyl bromide, 2 per cent. chloropicrin) [cf. *R.A.M.*, 25, p. 361; 27, p. 305; 30, p. 299] in the first week of October. 'Visqueen' plastic covering was used to retain the gas in the treated soil for about two days. When tobacco seedlings were grown in this soil the following spring the

treatment gave excellent control of damping-off (*Rhizoctonia* [*Corticium solani*] and *Pythium*). In further tests in the greenhouse with heavily infested greenhouse compost the compound gave satisfactory control of black root rot [*Thielaviopsis basicola*: ibid., 30, p. 631] and damping-off.

In general, applications of methyl bromide at 2 lb. per cu. ft. proved sufficient to control all soil-borne diseases of tobacco in Ontario. Elimination of damping-off and weeds was obtained at dosages of 2 ml. per cu. ft.; *T. basicola* was only partially controlled by this dosage, but was completely eradicated by one of less than 2 lb. per cu. ft. In all the experiments the treatment markedly stimulated seedling growth.

Crowdy (S. H.) & Wain (R. L.). **Studies on systemic fungicides. I. Fungicidal properties of the aryloxyalkylcarboxylic acids.**—*Ann. appl. Biol.*, 38, 2, pp. 318–333, 2 graphs, 1951.

In studies at Long Ashton Research Station, Bristol, and Wye College, Kent, on the systemic activity of the aryloxyalkylcarboxylic acids [see next abstract] in checking infection of broad bean by *Botrytis cinerea* or *B. fabae* (chocolate spot) the roots of young seedlings were allowed to stand in a solution containing 10 p.p.m. of the chemical for two to three weeks, and then inoculated by spraying both surfaces of the leaves with a spore suspension [of *B. fabae*]. The most promising compounds, which consistently reduced the mean size of the leaf lesions, were 2:4:6-trichlorophenoxyacetic acid, 2:3:4:5:6 pentachlorophenoxyacetic acid, and 2:3:4:5:6 pentachlorophenoxy*iso*butyric acid, which gave, respectively, mean percentage reductions of 37, 33, and 27 per cent. In one trial the same acids at only 1 p.p.m. gave reductions of 45, 22, and 22 per cent., respectively. The first-named caused slight root damage in some experiments.

In a soil treatment test bean seedlings in pots of sterilized soil were watered before inoculation with solutions of 50 p.p.m. of the acids for three weeks to build up a soil concentration of approximately 100 p.p.m. by weight of the acid. All the phenoxy acids significantly reduced infection except 2:4:5-tricholorophenoxy-*iso*butyric acid, which also weakened the plants by root damage. Uptake of the compounds was rapid and no marked tendency to accumulate in the tissues was observed. A further experiment demonstrated that 2:4:6-trichlorophenoxyacetic acid, pentachlorophenoxyacetic acid, and pentachlorophenoxy*iso*butyric acid were effective, during the limited period of the test, at a concentration of only 2 p.p.m., even allowing for uneven distribution in the soil, giving, respectively, 63, 60, and 77 per cent. control.

When successive generations of bean seedlings were raised in pots of soil given a single initial treatment, providing about 100 p.p.m. by weight of compound in the soil, inoculation following approximately one month after sowing, and fresh sowings being made after assessment, it was found that the compounds remained effective in the soil for a considerable period. In a garden trial the soil round fully grown bean plants was watered with a 500 p.p.m. suspension of each acid. Inoculation was effected about one week later; five weeks after treatment control by 2:4:6-trichlorophenoxyacetic acid was 83 and 63 per cent. on leaves and pods, respectively.

In order to test whether a compound sprayed on to the shoot could act systemically, one side of each of a number of double-stemmed plants was sprayed with 500 p.p.m. of 2:4:6-trichlorophenoxyacetic acid plus 0·5 per cent. wetter, a corresponding number of controls being sprayed with the wetter alone. The plants were inoculated after four days, and three days later lesion measurements showed definite evidence of a systemic effect; the percentage reduction on the unsprayed side in mean diameter of lesion calculated from the square of the diameter was 21, a result comparable with those obtained from root treatment. In a very limited

trial in a severely affected field plants were sprayed with the acids at 500 p.p.m. plus 0·5 per cent. wetter. Counts of the flowers shed from the top five inflorescences 19 days later showed that 2:4:6-trichlorophenoxyacetic acid had given a significant reduction of 41 per cent. Effective results were also given by stem injections.

Data from the screening trials suggest that 2:4:6-trichlorophenoxyacetic acid and the two pentachloro-acids all caused a reduction in growth of about 30 per cent. The loss in dry weight of plants raised in pots of treated soil was rather less (10 to 15 per cent.), 2:4:6-trichlorophenoxyacetic acid being the most toxic, although there was no obvious difference between the treated plants and the controls. In view of the effects which other compounds of this type have on flowering and fruiting special attention will have to be paid to the damage which may follow their use.

The results of the work indicate that phenoxy acids tend to accumulate in actively growing tissues. It is considered unlikely, however, that they persist for long periods in plant tissue. Soil applications may provide a safe and useful method of treatment.

WAIN (R. L.). **Plant growth-regulating and systemic fungicidal activity: the aryloxyalkylcarboxylic acids.**—*J. Sci. Food Agric.*, 2, 3, pp. 101–106, 1951.

This lecture, delivered in London on 16th January, 1951, before the Crop Protection Panel of the Agriculture Group of the Society of Chemical Industry, contains references to investigations now in progress on the fungicidal applications of aryloxyalkylcarboxylic acids for the control of chocolate spot of broad beans (*Botrytis cinerea* or *B. fabae*) [see preceding abstract].

MOREAU (C.). **Les maladies parasitaires des principales cultures coloniales. Revue bibliographique. VII.** [The parasitic diseases of the principal colonial crops. Bibliographical review. VII.]—*Rev. Mycologie, Suppl. colon.*, 16, 1, pp. 87–99, 1951.

Further notes [cf. *R.A.M.*, 30, p. 424] are given on the information in the literature (73 titles) published from 1948 to 1951 on the principal diseases of colonial crops.

DÉMÉTRIADÈS (S. D.). **Quelques observations sur le Sclerotinia sclerotiorum (Lib.) Massee.** [Some observations on *Sclerotinia sclerotiorum* (Lib.) Massee.]—*Ann. Inst. phytopath. Benaki*, 5, 1, pp. 40–46, 2 figs., 1951.

Many crops in Greece are attacked by *Sclerotinia sclerotiorum* [*R.A.M.*, 31, pp. 6, 30], chiefly in autumn, winter, and spring. Sclerotia remained viable for four years in the laboratory, one year in the soil, and one month in sterile water. Treatment with 1:1,000 mercuric chloride for periods varying from one minute to four hours had no effect on viability, even when the sclerotia were perforated, without the outer layer, or had been stored for three months in soil, in a saturated atmosphere, or under completely dry conditions.

Sclerotia placed on or buried in soil during August, September, October, and November, 1950, all formed apothecia in December, 1950, and January, 1951, while those put down in December and January produced apothecia in February and March, 1951. During March also fresh apothecia were produced by the sclerotia put down in the earlier months. Sclerotia placed on damp cotton in Petri dishes in the laboratory every fortnight from August, 1950, to January, 1951, produced mature apothecia successively from October to March within periods varying from 30 to 90 days. Apothecia were formed in all tests unless the sclerotia suffered a period of cold or prolonged inactivity [ibid., 29, p. 45]. Three-year-old sclerotia also produced apothecia in the laboratory but seven-year-old ones did not.

Gregory (P. H.). **Deposition of air-borne Lycopodium spores on cylinders.**—*Ann. appl. Biol.*, 38, 2, pp. 357–376, 1 pl., 2 figs., 5 graphs, 1951.

A preliminary note on these studies at Rothamsted Experimental Station has already been noticed from another source [*R.A.M.*, 29, p. 632]. This paper gives details of the wind tunnel, wind velocity profile, spore input mechanism, traps and spores used, cross-wind variations in spore deposition, distribution of spores on trap surfaces, methods of investigation, and measurement of spore cloud density by suction traps; the efficiency of cylinders, the distribution of particles over their surfaces, and orientation; and the relevance to field conditions.

The standard vertical sticky traps used in routine trapping of fungal spores, pollen, and crop-protectant sprays and dusts have a low trapping efficiency. The data obtained indicate some of the reasons for the low coverage rates sometimes obtained with dusts and sprays. Larger surfaces opposing the spray cone will be less efficiently covered than smaller ones; increase in the velocity of the particle or droplet will increase the efficiency of impaction. It appears that the difficulty of covering a plant surface with spray or dust by impaction is greatly increased if the speed of fall of the particles is under 1 to 2 cm. per sec. Similar considerations apply to the deposition of fungal spores on plant surfaces. The ultimate elements of the feathery stigmas of grasses, which are about 30 μ in diameter, probably trap smut spores with high efficiency. The spores of most dry, air-borne, leaf and stem parasites are fairly large and should be impacted under ordinary conditions at efficiencies of about 10 per cent. Many typical soil inhibitants, however, have very small spores. The deposition by impaction of an *Aspergillus*, *Penicillium*, or *Lycoperdon* spore on a stem or leaf must be an uncommon occurrence and the removal of such spores from the atmosphere may be due to sedimentation in confined spaces among vegetation or to washing of the air by rain.

Rippel-Baldes (A.). **Grundriss der Mikrobiologie. Zweite Auflage.** [Outline of microbiology. Second edition.]—vii+404 pp., 128 figs., 3 diags., 24 graphs, Berlin, Springer-Verlag, 1952. DM. 36.

The advances made in many branches of microbiology since the publication of the first edition of this treatise in 1947 have necessitated considerable revision and amplification. An introduction to the subject, in which a short account is given of its history, and cultural and diagnostic methods are described, is followed by sections on the construction of the cell and brief surveys (pp. 73, 78–89) of the various groups of fungi; the metabolism of mineral salts, carbon, nitrogen, and organic compounds and the effect of external conditions; the products of enzyme action and aerobic and anaerobic respiration information (pp. 177–181) on acid production by *Aspergillus* and other fungi; decomposition and synthesis; and the position of micro-organisms in nature, containing observations, e.g. on actinomycetes plus plant roots (p. 324); fungi plus plant roots or mycorrhiza (pp. 325–331); fungi as epiphytes and symbionts of aerial plant organs (pp. 337–340); micro-organisms and man (pp. 347–351); parasitism (pp. 352–358); interfungal parasitism (pp. 358–359); parasitism in plants and animals (pp. 359–360); bacterial and fungal diseases of plants (pp. 360–367); and micro-organisms as parasites on man and animals (pp. 372–379).

Each section is fully documented and the work concludes with a selected list of books and periodicals dealing specifically with microbiology.

Beloruchev (E. A.). Как приготовить для длительного хранения коллекцию шляпочных грибов. [How to prepare a collection of cap fungi for long preservation.]—Природа [*Nature*], *1951*, 7, p. 69, 1 fig., 1951.

A satisfactory method of preserving the larger fungi for many years with their natural freshness and colour consists in pricking the stipe and the cap of a healthy

specimen, freshly gathered in dry weather, with a needle and pouring over it Magnitsky's solution (5 gm. boric acid, 10 ml. 5 per cent. zinc sulphite, 200 ml. 10 per cent. formalin, 10 ml. distilled water, and 30 gm. sugar). After soaking for two to six hours and drying for half an hour on a plate in the dark, the fungus is fixed on the vertical end of a wire rising from a flat spiral base inside a glass cup. The cup is filled with carbon dioxide and sealed with a ground glass stopper smeared with vaseline.

Woodbine (M.), Gregory (Margaret E.), & Walker (T. K.). **Microbiological synthesis of fat : preliminary survey of the fat-producing moulds.**—*J. exp. Bot.*, 2, 5, pp. 204–211, 1951.

A survey of the literature on potential fat-producing moulds [*R.A.M.*, 30, p. 530], made at the Division of Industrial Biochemistry, Manchester University, showed that at least 40 strains from ten species are of interest. When these were investigated on five different media *Aspergillus nidulans*, *Penicillium spinulosum*, *P. javanicum* [ibid., 14, p. 522], *P. piscarium*, *P. flavo-cinereum* [loc. cit.], *P. oxalicum*, *A. flavus* [loc. cit.], and *A. flavipes* proved the most promising. The maximum fat content (in gm. per 100 gm. dried felt) was 39·7 per cent. for *A. flavipes* on Czapek-Dox medium and 34·6 per cent. for *Fusarium lini* on a glucose–mineral salts medium with added corn-steep liquor. *P. javanicum* ranked third. The potential value of micro-organisms as fat-producers is discussed.

Bryden (J. D.) & Mandelson (L. F.). **Mould development in canned Prunes.**—*Agric. Gaz. N.S.W.*, 62, 6, pp. 297–300, 4 figs., 1 graph, 1951.

In an investigation in New South Wales into the correlation between moisture content and [unspecified] mould growth developing on canned [dried] prunes when opened, four lots of 1 lb. cans of d'Agen prunes of moisture content 31·2, 36·1, 39·4, and 42·6 per cent., respectively, were opened on 10th August, 1950, and the fruits transferred to sterile Petri dishes and exposed to natural infection at room temperature for 24 hours, after which the lids were replaced and the dishes incubated at 25·5° C. After 22 days' incubation the samples at 31·2 per cent. moisture content showed no mould, and though all those at 36·1 per cent. or over were affected no mould development was obvious in the 36·1 per cent. moisture series until after two weeks' incubation. It is concluded, therefore, that the recommendation of the Dried Fruits Processing Committee in proposing an upper limit of 37 per cent. moisture for No. 10 and smaller cans of d'Agen prunes is a satisfactory figure.

Levin (G. G.). Динамика витамина B_2 у гриба **Aspergillus niger** в зависимости от условия его развития. [Dynamics of vitamin B_2 in the fungus *Aspergillus niger* according to the conditions of its development.]—Микробиология [*Microbiology*], 20, 5, pp. 406–414, 1951.

All strains of *Aspergillus niger* [*R.A.M.*, 24, p. 67] tested at the Zhdanov State University, Leningrad, were able to synthesize vitamin B_2, this being connected with the assimilation of nitrogen [ibid., 29, p. 509] by the fungus. Vitamin B_2 content reaches its maximum in the first days of growth and as the fungus matures it is reduced, but if nitrogen is added to the nutritive media the reduction is halted to a certain extent so that the old pellicles are as rich in vitamin B_2 as the young.

Darpoux (H.) & Faivre-Amiot (A.). **Antagonismes microbiens et substances antibiotiques dans la lutte contre les maladies des plantes.** [Microbial antagonism and antibiotic substances in the control of plant diseases.]—Reprinted from Proceedings of the IInd International Congress of Crop Protection, 8 pp., 8 figs., [? 1950. Received January, 1952].

In this paper, most of which is based on the literature or has been noticed from

other sources [*R.A.M.*, 30, p. 184; 31, p. 29], the authors describe methods for determining the antagonistic action of various organisms or of the antibiotics secreted by them against bacteria and plant pathogenic fungi, and list those which were inhibited [see above, pp. 234, 238, 244]. The results obtained against soil organisms and viruses *in vitro* are briefly outlined, and future prospects of controlling plant diseases by these methods are discussed [ibid., 31, p. 74].

Bibliography of the literature on the minor elements and their relation to plant and animal nutrition. Fourth edition, volume I.—1,037 pp., 1948; Volume II.—152 pp., 1951; Chilean Nitrate Educational Bureau, Inc., 120 Broadway, New York. [Received March, 1952.]

Volume I of this edition (the eleventh publication in the present series) [cf. *R.A.M.*, 27, p. 437] contains approximately 10,000 abstracts taken mainly from *Chemical Abstracts*, *Experiment Station Record*, and *Soils & Fertilizers*, and includes all material published in the previous volumes together with some new entries. It is considered to be complete up to July, 1947. There are author, element, general nutrition, and botanical indexes.

Volume II, containing 1,222 abstracts, includes material published from July, 1947, to December, 1950.

Gentile (A. C.). **A study of the toxin produced by an isolate of Botrytis cinerea from Exochorda.**—*Physiol. Plant.*, 4, 2, pp. 370–386, 2 figs., 1951.

At the Department of Botany, Brown University, Rhode Island, an isolate of *Botrytis cinerea* from *Exochorda racemosa*, when grown on Richards's medium, secretes a thermostable, non-volatile compound which proved capable of inducing wilt in Stone tomato seedlings. The product is not identical with lycomarasmin [*R.A.M.*, 30, p. 548]. Although the fungus produces a polysaccharide and a lower protein, these compounds are not responsible for the wilt [cf. ibid., 28, p. 363]. Thiourea and urea were produced in several of the cultures and shown to be able to cause wilt of tomato seedlings; their presence in the medium, however, was not essential for this purpose. Factors promoting more copious toxin production included simultaneous rapid growth of the fungus, lowering the pH of the medium, and carbohydrate utilization.

Dowson (W. J.) & Rudd Jones (D.). **Bacterial wet rot of Potato tubers following Phytophthora infestans.**—*Ann. appl. Biol.*, 38, 1, pp. 231–236, 1951.

Potato tubers infected with *Phytophthora infestans* in the field produce abnormal amounts of liquid, often appearing on the surface of tubers kept in a saturated atmosphere, and favouring the development of a bacterial soft rot [*R.A.M.*, 24, p. 163]. At the Botany School, Cambridge, a similar liquid was produced experimentally on healthy tubers inoculated with pure cultures of *P. infestans*. When further inoculated with pure cultures of *Bacterium carotovorum* strain P2 [*Erwinia carotovora*: ibid., 30, p. 340], *Pseudomonas fluorescens* [ibid., 31, p. 9], or *B. rubefaciens* (isolated from rotting tubers), a wet rot developed, spreading in the presence of *E. carotovora* and confined to the zone of fungus invasion in the case of the saprophytic bacteria.

Sap extracted from tissues of Arran Banner, King Edward, and Duke of York tubers inoculated with *Phytophthora infestans* contained more sugar and had a greater osmotic pressure than sap from healthy tissues, indicating that water may be drawn from adjacent healthy cells and accumulated in the infected tissue, providing an ideal medium for the growth of secondary bacteria.

Montaldo (A.) & De Rojas Peña (E.). **Fitomejoramiento para resistencia al tizón de la Papa. I. Prueba de la reacción al Phytophthora infestans.** [Plant breeding for resistance to Potato blight. 1. Testing for reaction to *Phytophthora infestans*.]—*Agric. téc., Chile*, 10, 2, pp. 66–73, 1950. [English summary.]

Studies were carried out at the Potato Experiment Station, Bogotá, Colombia, to determine the reaction to *Phytophthora infestans* of the foliage of the wild *Solanum* species, *S. maglia* var. *collinum*, *S. brevidens*, *S. tuberosum* var. *chillanense*, and *S. palustre* [cf. *R.A.M.* 31, p. 138], and of cultivated Chilean potato varieties and seedlings. Dickinson and Keay's technique for the isolation and culture of the pathogen [ibid., 27, p. 441] was used in the experiments on the wild species, all of which proved to be highly susceptible and *S. palustre* excessively so.

All the cultivated varieties exposed to natural infection in the field by the race or race complex of the fungus occurring in the Sabana de Bogotá and the Páramo de Usme [ibid., 28, p. 415] were severely attacked, among the most susceptible being the newly developed Cunca, outstanding for its productivity and adaptability.

New Colombian breeding material which is expected to combine resistance to *P. infestans* with other desirable agronomic characters has been planted at the Centinela Potato Experiment Station, Chile. It includes six interspecific crosses between *S. demissum* and *S. andigenum* var. *tuquerreña*, one seedling from a back-cross of *S. tuberosum* and *S. demissum*, and eight family lines of *S. demissum*×*S. tuberosum*.

Stelzner (G.). **Über die Erzeugung von Bastarden von Sol. polyadenium (Greenm.) mit Kulturkartoffelsorten und ihre Resistenzmerkmale.** [On the production of hybrids of *Sol(anum) polyadenium* (Greenm.) with cultivated Potato varieties and their resistance characters.]—*Züchter*, 19, 11–12, pp. 331–333, 1 fig., 1949.

Some of the F_1 hybrids between the commercial potato varieties Ackersegen and Frühnudel and the wild *Solanum polyadenium*, developed at the Max Planck Plant Breeding Institute, Voldagsen, Germany, showed partial resistance to *Phytophthora infestans* [cf. *R.A.M.*, 31, p. 138] and potato virus Y and tolerance of leaf roll virus.

Świeżyński (K.). **A simplified serological test for the determination of virus X in Potato plants.**—*Acta Soc. Bot. Polon.*, 20, 2, pp. 513–521, 1 fig., 1 diag., 1 graph, 1950. [Received November, 1951.]

Work on the development of the following simple and reliable technique for detecting virus X in potato plants [*R.A.M.*, 31, p. 75], and also for general application, was begun at the Plant Virus Research Unit, Cambridge, and continued at the Potato Research Station, Żelazna. Three drops of crude sap from each leaf sample are mixed, two with drops of rabbit antiserum at dilutions of 1:4 and 1:8, respectively, prepared by injections of clarified infective tobacco sap, and one with serum from rabbits inoculated with healthy sap, in three depressions, respectively, in a porcelain spot test plate which has four rows of depressions so that four samples can be tested on one plate. The serum should be kept for some time at room temperature before using. After being shaken until the mixtures appear quite homogeneous the plates are stacked or covered with a small glass pane to prevent drying out, and the results read five minutes later. The formation of a green aggregate at the edge of a drop indicates the presence of the virus. When no virus is present the mixture remains transparent.

The above method, which is designed primarily for field work on leaves, is more rapid than any other tried by the author and the ease with which control tests may be carried out on the same plate makes the results reliable. Sensitivity is greater than that of other agglutination methods, but less than that of precipitation methods [loc. cit.].

Warren (J. R.), Graham (F.), & Gale (G.). **Dominance of an actinomycete in a soil microflora after 2, 4-D treatment of plants.**—*Phytopathology*, 41, 11, pp. 1037–1039, 1 fig., 1951.

Diluted samples of soil supporting 16 tomato plants sprayed with 2,4-D at Duke University, Durham, North Carolina, yielded fewer colonies in beef extract-peptone agar plates than those from the same number of untreated plants. Conspicuous among the former colonies was an actinomycete which inhibited the growth on agar media of numerous fungi [cf. next abstract], including *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, 30, p. 482], *Sclerotinia cinerea* [*S. laxa*], *Sclerotium rolfsii*, *Alternaria solani*, *Venturia inaequalis* [ibid., 31, p. 197], *Blastomyces dermatitidis*, and *Epidermophyton* [*Trichophyton*] *interdigitale* [cf. ibid., 30, p. 577].

The cultural characters of the actinomycete are briefly indicated.

Thornton (H. G.). **Soil microbiology department.**—*Rep. Rothamst. exp. Sta., 1950*, pp. 50–54, 1951.

Using his method of standardizing the size of actinomycete colonies [*R.A.M.*, 30, p. 333] F. A. Skinner found that actinomycetes will inhibit *Fusarium culmorum* and other soil fungi [cf. preceding abstract] on media with a low level of nutrients approaching that of soil. This suggests that they may also produce antibiotic substances in soil. As, however, antagonism on agar plates can be prevented by the inclusion in the medium of an adsorbent, such as bentonite, the antibiotic substances may also be rendered ineffective by the clay colloids. In sand culture *F. culmorum* was strongly inhibited by actinomycetes.

In work by Dr. Janet Brind serial dilutions of a suspension of fresh soil known to contain the endotrophic mycorrhizal fungus *Rhizophagus* [cf. ibid., 21, p. 300; 25, p. 177; 26, p. 505] were used to inoculate sterilized sand sown with red clover. In a preliminary experiment the fungus was present at dilutions of 1 in 100 and lower and absent at 1 in 1,000, but infected and uninfected pots occurred within one dilution. In another experiment infection took place in half the pots (10) at 1 in 500. Dry weights of the infected plants showed no significant difference from those of uninfected ones.

Chevaugeon (J.). **Une fusariose du Piment en Côte d'Ivoire.** [A fusariosis of Pimento in the Ivory Coast.]—*Rev. Mycologie, Suppl. colon.*, 16, 1, pp. 81–86, 2 figs., 1951.

In May, 1949, the native, long-fruited variety of chilli cultivated in small plantations between the village of Adiopodoume and the forest, Ivory Coast, became attacked by *Fusarium semitectum* var. *majus* [cf. *R.A.M.*, 16, p. 601; 17, p. 161; 30, pp. 36, 56], appreciable losses being sustained. The first symptoms consisted in a necrosis of the floral parts. As a rule the stamens were infected first, infection then spreading to the gynoecium and petals; calyx infection and its destruction always occurred late and was seldom complete. When the flowers were attacked early in the course of the disease the fruit failed. Late infection resulted in small, flat fruits; dark green spots rapidly appeared at the apex and the entire fruit rotted.

The most severely affected plantings were situated in a narrow valley with very steep sides. Percentage infection appeared to be higher on the slopes than at the bottom. In 1949 the wet season was late and May was marked by brief, violent tornadoes with dry periods between. The attack ceased as soon as the rainfall became more regular. The outbreak appeared to be associated with alternate periods of wet and dry weather and unbalanced water supply. Losses would be reduced by stabilising the water content of the soil; growers should maintain a suitable plant cover.

THOMAS (C. A.). **Anthracnose of Digitalis.**—*Phytopathology*, 41, 11, pp. 997–1000, 1951.

Digitalis lanata, cultivated on a limited scale for medicinal purposes in the United States, is liable to severe infection by *Colletotrichum fuscum* [*R.A.M.*, 29, p. 171]. At the Plant Industry Station, Beltsville, Maryland, and in Pennsylvania, the disease was completely controlled by 15 minutes' immersion of naturally infected seed in water heated to 55° C., following preliminary treatment in cold water for four hours and then in water at 50° for one minute. Disease development was most severe at 25° and 30°. The results of inoculation experiments to determine the reactions of five species to *C. fuscum* showed *D. sibirica* and *D. purpurea* to be the most resistant, *D. ferruginea* and *D. lanata* the most susceptible, and *D. ambigua* intermediate.

ADSUAR (J.). **Preliminary report of a mosaic disease of the resistant Sugar Cane variety Mayagüez—336.**—*Tech. Pap. P.R. agric. Exp. Sta.* 7, 9 pp., 1 fig., 1950.

A description is given of a new virus disease in Puerto Rico found in April, 1949, and again in March and May, 1950, on the sugar-cane variety Mayagüez 336 which, to the author's knowledge, is resistant to the ordinary sugar-cane mosaic virus present in the island [*R.A.M.*, 30, p. 123]. The chief symptom is a leaf pattern of green blotches on a yellowish background. The virus (designated YM-336) has so far been transmitted (by carborundum inoculation) only to Mayagüez 336 (4 out of 104 cuttings) and sorghum, the symptoms on the latter being very reminiscent of common mosaic, though of a more pronounced character. Further studies are in progress.

SAREJANNI (J. A.) & DÉMÉTRIADÈS (S. D.). **Catalogue commenté No. 2 des champignons et bactéries rencontrés sur les plantes cultivées en Grèce.** [Annotated list No. 2 of the fungi and bacteria occurring on cultivated plants in Greece.]—*Ann. Inst. phytopath. Benaki*, 5, 1, pp. 5–11, 1951.

This second annotated list of fungi found on cultivated plants in Greece [cf. *Ann. Inst. phytopath. Benaki*, 3, 2, 1939] includes the following new records: *Xanthomonas campestris* on cauliflower [C.M.I. map No. 136] near Athens; *X. juglandis* on walnut [ibid., No. 133] near Edessa and in other districts of western Macedonia; *Phytophthora syringae* on lemons [ibid., No. 174] and *Fomes rimosus* [cf. *R.A.M.*, 12, p. 254] affecting *Pistacia lentiscus* var. *chia* on the island of Chio; *Sclerotinia sclerotiorum* [see above, p. 250] on tomato near Athens; *Ganoderma lucidum* attacking the trunks of olive trees [ibid., 19, p. 174] near Agrinion; *Schizophyllum commune* [ibid., 19, p. 582] on apple, pear, and cherry trees and on vines near Thessaly, on walnut near Veria, and on oak near Veria and Florina, western Macedonia; *Ustilago tulipae* on tulip [ibid., 29, p. 619] on Mont Parnès; *Ascochyta cichorii* on chicory at Kiphissia; *Colletotrichum circinans* on onion in the Edessa district; and *Cercosporella herpotrichoides* on wheat [C.M.I. map No. 74] in Laconia.

GREGORY (P. H.). **The fungi of Hertfordshire.**—*Trans. Herts. nat. Hist. Soc. Fld Cl.*, 23, 4, pp. 137–208, 1951.

This systematic list of fungi recorded in Hertfordshire, a compilation of records extending over more than a century, includes *Actinomyces tumuli* [cf. *R.A.M.*, 29, p. 241] on beet, *Spongospora* sp. on watercress [ibid., 30, p. 354], *Aphanomyces euteiches* causing root rot of peas [ibid., 30, p. 416], *Aphanomyces* sp. causing stem and root rot of violas, *Bremia lactucae* on *Gaillardia aristata* [cf. ibid., 18, p. 139], *Phytophthora verrucosa* causing toe rot of tomato [cf. ibid., 31, p. 213], *Empusa planchoniana* [ibid., 30, p. 523] on *Myzus persicae* and *Aphis fabae* in glasshouses, *Entomophthora aphidis* on aphids [cf. ibid., 30, p. 609] on various hosts, *Pericystis apis* causing 'chalk brood' of honey bees [cf. ibid., 26, p. 200], and *Puccinia aegra* on violas.